ORDER NO. ARD-7706063C

Service Manual

Cassette Deck

RS-646DS-D

Portable High-Fidelity Stereo Cassette Deck with
Separate Bias/Equalizer and Mic Attenuator

RS-640U MECHANISM SERIES

Specifications (Catalog specifications for sales)

Power requirement:	**AC; 110/220 V, 50/60 Hz** Power consumption; 10 W DC; 12 V, eight R-20 size dry cell batteries
Motor:	1-DC electronical speed control motor
Track system:	4-track 2-channel stereo recording and playback
Tape speed:	4.8 cm/s
Battery life:	Approx. 32 hours with alkaline batteries
Wow and flutter:	0.1% (WRMS), ±0.2% (DIN)
Frequency response:	CrO_2 tape; 50~14,000 Hz ±3 dB 45~14,000 Hz (DIN) Normal tape; 50~14,000 Hz ±3 dB 45~14,000 Hz (DIN)
Signal-to-noise ratio:	Dolby NR in; 66 dB (above 5 kHz) Dolby NR out; 56 dB (signal level=max. recording level)
Fast forward and rewind time:	Approx. 130 seconds with C-60 cassette tape

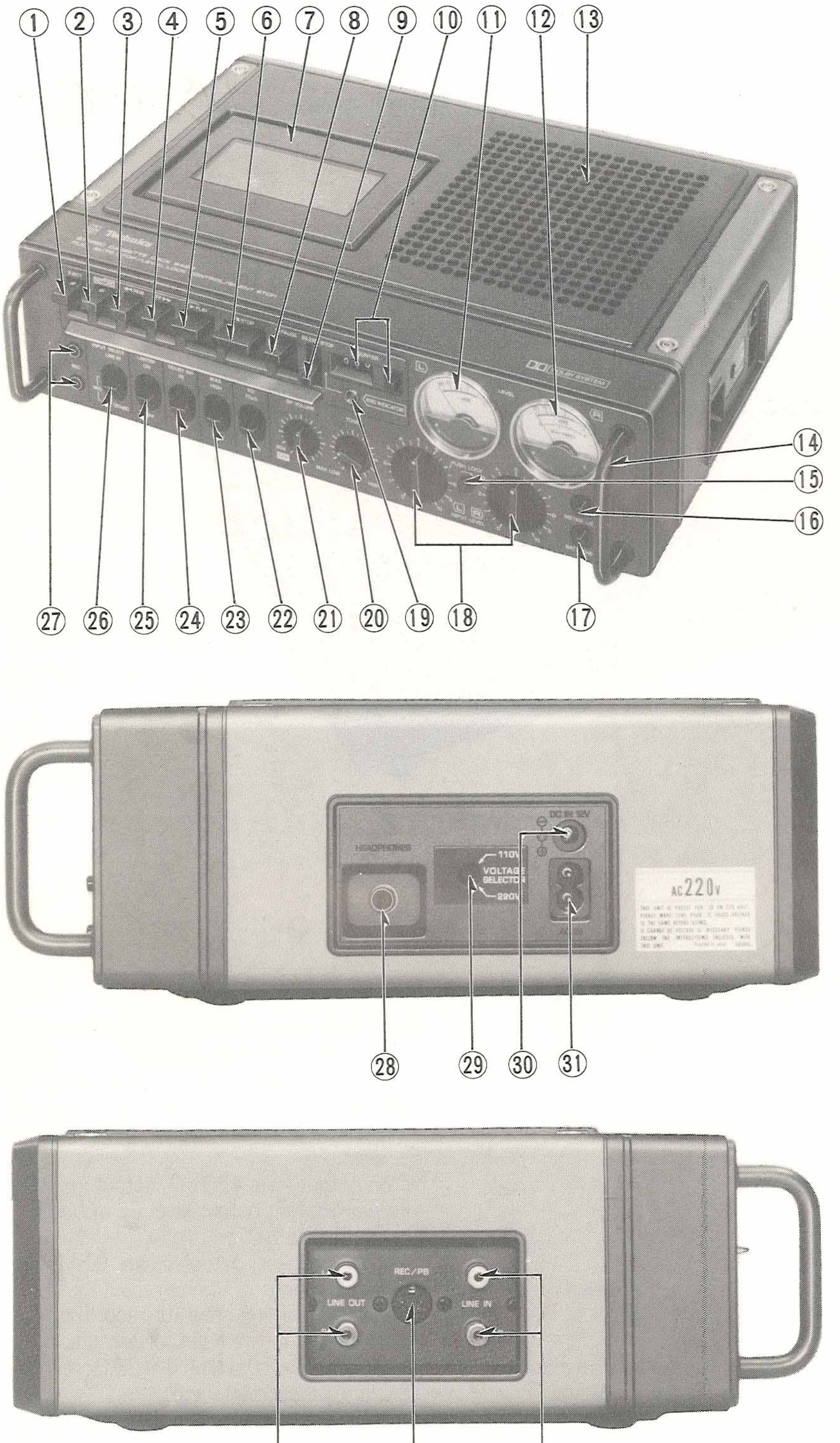
Input:	MIC; sensitivity 0.25 mV/applicable microphone impedance 400Ω~10 KΩ LINE; sensitivity 60 mV/input impedance 47 KΩ DIN; sensitivity 16 mV/input impedance 2.7 KΩ
Output:	LINE; output level 420 mV/load impedance 50 KΩ over DIN; output level 420 mV/output impedance 1 KΩ HEADPHONE; output level 65 mV/load impedance 8Ω Monitor speaker; output power 0.8 W (monaural)
Head:	2-head system 1-super permalloy head for record/playback 1-doubl gap ferrite head for erasure
Dimentions:	36.3 cm(W)×10.6 cm(H)×28.0 cm(D)
Weight:	5.0 kg (without batteries)

Specifications are subject to chang without notice.

National Technics

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

LOCATION OF CONTROLS AND COMPONENTS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HEADPHONES
110V
VOLTAGE SELECTOR
220V
DC IN 12V
AC220V
㉘
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㉛
REC/PB
LINE OUT
LINE IN
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㉝
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① Eject button
② Record button
③ Rewind button
④ Fast forward button
⑤ Playback button
⑥ Stop button
⑦ Cassette compartment cover
⑧ Pause button
⑨ Silent-stop button
⑩ Tape counter and reset button
⑪ Level meter
⑫ Level/battery check meter
⑬ Built-in speaker
⑭ Handle
⑮ Level controls lock button
⑯ Meter light button
⑰ Battery-check button
⑱ Input level controls
⑲ Tape-end indicator
⑳ Tone control
㉑ Speaker volume control
㉒ Equalization selector
㉓ Bias selector
㉔ Dolby noise-reduction switch
㉕ Limiter switch
㉖ Input selector
㉗ Microphone jacks
㉘ Headphones jack
㉙ Voltage selector switch
㉚ Car battery input jack
㉛ AC connection socket
㉜ Line output jacks
㉝ Record/playback DIN socket
㉞ Line input jacks

Fig. 1

DISASSEMBLY INSTRUCTIONS

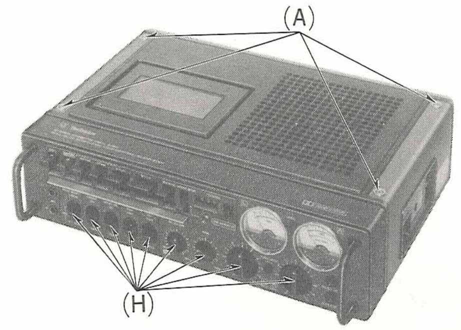


Fig. 2

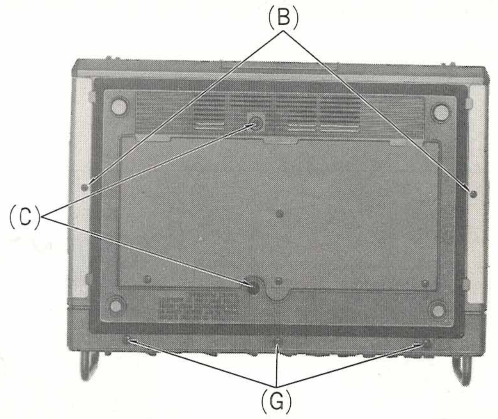


Fig. 3

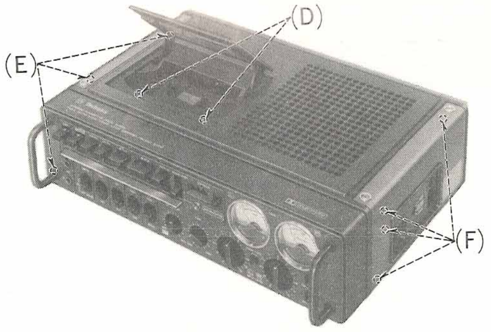


Fig. 4

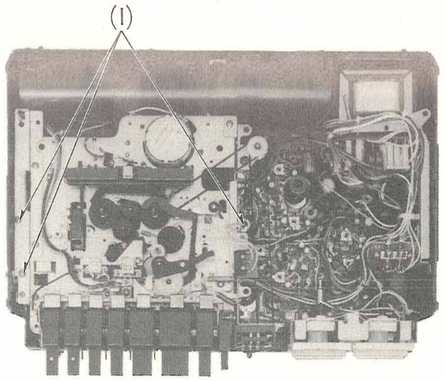


Fig. 5

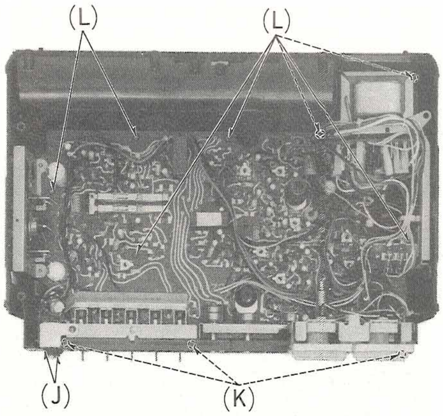


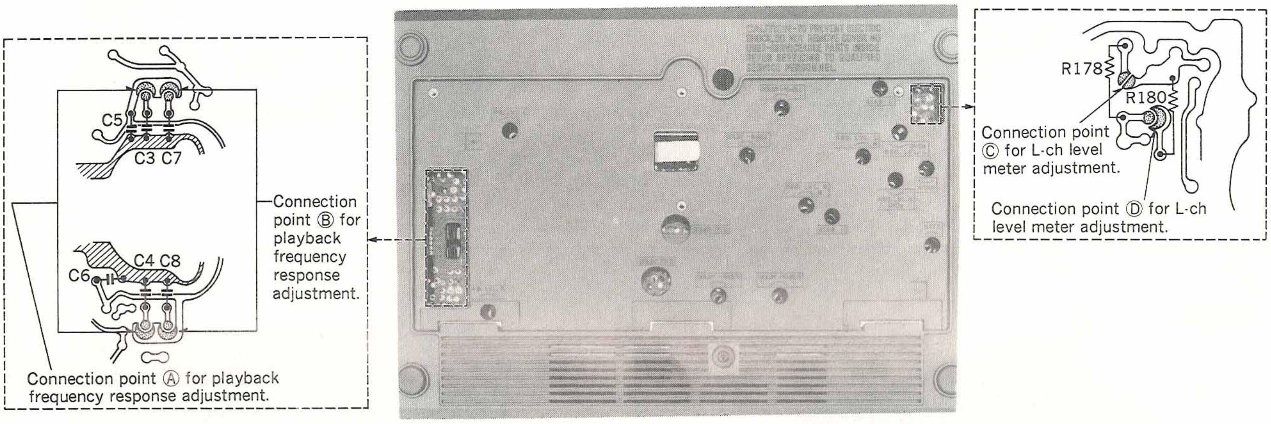
Fig. 6

Procedure	To remove ——.	Remove ——.	Pcs.	Shown in fig. ——.
1	Top panel	(A), (B), (C), (D), (E), (F)	4, 2, 2, 2, 3, 4	2, 3, 4
2	Front panel	(G), (H)	3, 9	2, 3
3	Mechanism	(I)	3	5
4	Amplifier	(J), (K), (L)	2, 3, 7	6

MEASUREMENT & ADJUSTMENT

BEFORE ADJUSTMENTS OR REPAIRS ······

1. For electrically related adjustments only, each of the variable resistors and connection points for adjustment can be seen when the bottom cover is removed as shown in fig. 7 below. Make adjustments by referring to each adjustment description.



C5
C3 C7
C4 C8
C6
Connection point Ⓑ for playback frequency response adjustment.
Connection point Ⓐ for playback frequency response adjustment.
R178
R180
Connection point Ⓒ for L-ch level meter adjustment.
Connection point Ⓓ for L-ch level meter adjustment.

Fig. 7

2. When electrical parts of printed circuit board are to be repaired, remove the mechanism, amplifier and power supply printed circuit board from the case as shown in fig. 8 below. When each section is reconnected by connectors, the operation of each section can be confirmed.

Note: 1. Secure the mechanism assembly to the jack angle.
2. Secure the power supply printed circuit board, in the same way, to the headphone jack angle.

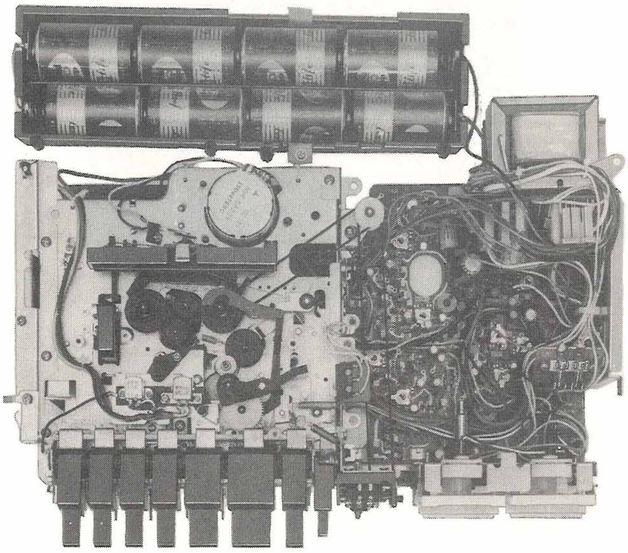


Fig. 8

ADJUSTMENTS

Before measuring and adjusting "Overall frequency response", "Overall distortion" and "Overall S/N ratio", confirm that the characteristics of 5 items below are within standard which have much relation to or influence on electrical performances above.

1. Head azimuth adjustment. 2. Bias current. 3. Playback gain. 4. Overall gain.
5. Playback frequency response.

I. TEST INSTRUMENTS

1. Prepare test instruments which are equivalent in accuracy to those shown below.
2. The test instruments should be inspected and corrected by specialists once every 6 months, because a long period of use without maintenance may increase errors in indication.
3. Warm-up the test instruments for 30 minutes and the set to be measured for 10 minutes before taking the measurements. If not, there may arise an error or difference between the initial value and the stabilized value measured after "aging".
4. Specifications of test instruments.

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(1) Audio frequency oscillator

a. Oscillation frequency: 5 Hz~500 kHz (5 ranges)
b. Frequency tolerance: ±(3% +1 Hz)
c. Sine wave
  * Output voltage (at 25°C): 5 Vrms ±10% (without load)
  2.5 Vrms ±10% (with 600Ω load)
  * Output frequency response: Within ±0.2 dB, 20 Hz~20 kHz
  Within ±0.5 dB, 5 Hz~500 kHz
  * Distortion factor: Not more than 0.05%, 200 Hz~20 kHz
  Not more than 0.5%, 5 Hz~500 kHz
  * Output impedance: 600Ω unbalanced, within ±15%
  * Output attenuator: 0 dB, 20 dB, error; within ±0.2 dB
d. Temperature in use of set: Temperature=0~40°C, humidity=90% or less

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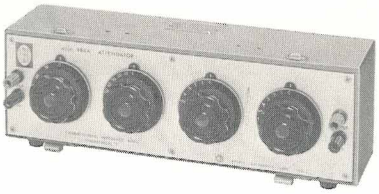
(2) Automatic-stop distortion meter (with vacuum tube voltmeter)

A. Distortion factor measurement
  a. Frequency (fundamental wave): 400 Hz, 1 kHz ±10%
  b. Measurement: 0.1~100% (6 ranges)
  c. Input: 50 mV~50 V
  d. Fundamental wave attenuation: 60 dB or more
B. Level measurement
  a. Measurement: 1 mV (−60 dB)~30 V (30 dB) (9 ranges)
  b. Frequency response (1 kHz basis): 20 Hz~100 kHz ±0.3 dB
  c. Input impedance: 1 MΩ ±10%, less than 50 pF
  d. Error in indicated value: Within ±3% at 1 kHz
C. Output terminal
  a. Frequency response: 10 Hz~100 kHz ±1 dB
  100 kHz~1 MHz ±3 dB
  b. Output voltage: 1 Vrms ±10% (1 kHz sine wave)

(3) Attenuator

a. Input impedance:	600Ω unbalanced
b. Maximum attenuation:	121 dB
c. Minimum attenuation:	0.1 dB



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(4) Oscilloscope

a. Cathode ray tube:	Effective ranges 8×8 cm
b. Vertical axis	
* Input sensitivity:	30 mV～30 V/cm
* Frequency band:	DC～2 MHz
* Transient time:	180 ns.
* Input impedance:	1 MΩ, 35 pF
c. Horizontal axis	
* Tuning range:	30 Hz～2 MHz
* Sweep time:	1μs～100 ms/cm
* External sweep:	1 Vp-p/cm or more

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(5) Digital electronic counter

a. Number of figure:	4 (decimal system)
b. Input sensitivity:	100 mVrms
c. Input impedance:	1 MΩ, 40 pF
d. Frequency measurement range:	10 Hz～100 kHz
e. Counting time:	0.1 s, 1 s, 10 s

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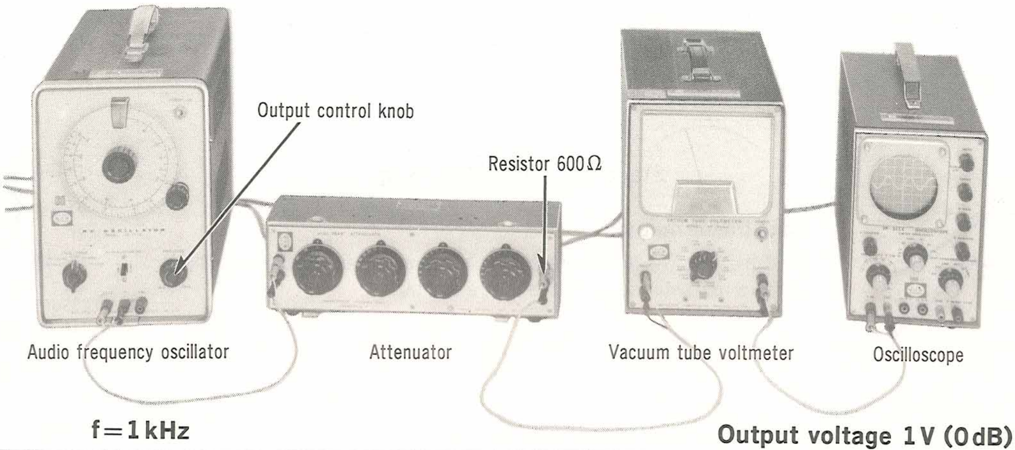
(6) Wow meter

a. Measured center frequency range:	3 kHz ±4%
b. Input level range:	30 mV～3 V
c. Input impedance:	About 50 KΩ unbalanced
d. Measurement:	0.01～3% (5 ranges)
e. Indicator error:	Maximum error in indicated value ±5% in each range.
f. Frequency response:	Conforming to weighting curve characteristics (WRMS), JIS C5551. Flat characteristics (RMS) 0.5～200 Hz, within −3 dB (4 Hz basis)
g. Meter indication system:	Effective value indication, conforming to JIS C5551.
h. Meter response characteristic:	About 5～7 sec.
i. Oscillation frequency:	3 frequencies (3 kHz, 3 kHz ±3%)
j. Temperature range:	0～40°C

II. MEASUREMENT CONDITIONS

1. Standard measurement conditions
    - ∗ Ambient temperature: 10～30°C (50～86°F)
    - ∗ Ambient humidity: 30～90% RH
    - ∗ Power voltage accuracy: ±3%
2. Position of tape recorder
    - ∗ When measuring, place the unit under test in a horizontal position.
3. Oscillator output voltage adjustment
    - ∗ Connect the equipments as shown in the following and adjust the oscillator output control knob for 1 V (f=1 kHz) through the attenuator while keeping the attenuator at 0 dB.
    - ∗ When supplying a signal to the tape recorder amplifier, adjust the input level using the attenuator.



III. TEST TAPE

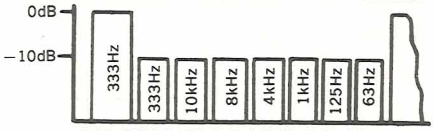
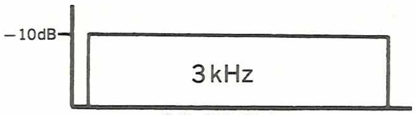
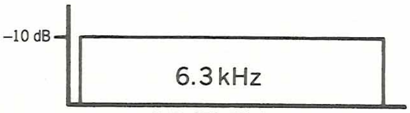
Test tape life

The more frequently the test tape is used, the more the tape characteristics will deteriorate (e.g. lowering of recorded level, worsening of frequency response particularly in high-frequency range, and an increase in wow due to tape elongation) until measured values become unreliable. Even in such a case when a tape is not used, but stored, for a long period of time, tape shows deterioration in performance because of self damagenetization due to storage conditions, etc.

Please refer to the tape life specification and use care not to use a tape longer than its rated life when servicing.

Frequence of use: Not more than 20 times for each tape length.
Storage period: Not more than 6 months.

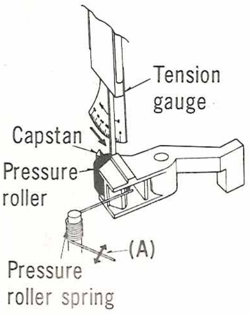
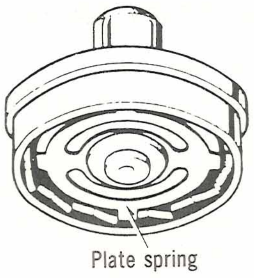
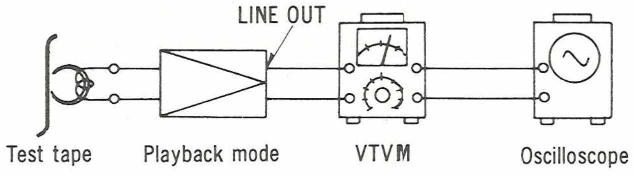
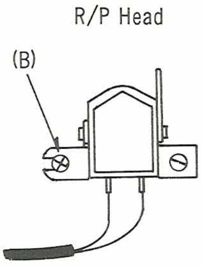
Test tape

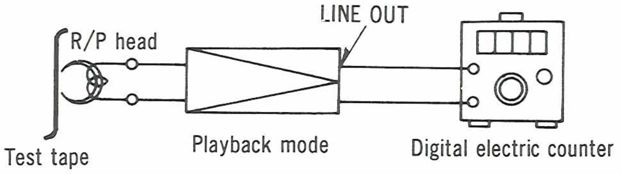
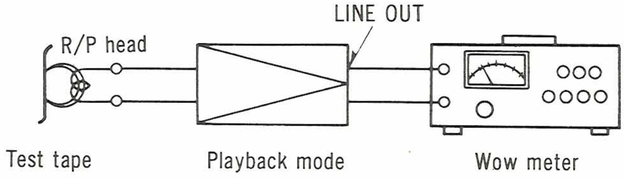
PARTS NO.	PARTS NAME	SPECIFICATIONS	REMARKS
C-FH	Standard recording level and frequency response tape	 0dB: STANDARD REC. LEVEL (160pWb/mm)	5 times repetitive recording Tape speed: 1-7/8 ips. (4.8 cm/s) Full track (10 min.)
C-WAT	Wow and tape speed tape	 0dB: 250pWb/mm	Tape speed: 1-7/8 ips. (4.8 cm/s) Full track (45 min.)
C-C-AA	Azimuth tape	 0dB: 250pWb/mm	Tape speed: 1-7/8 ips. (4.8 cm/s) Full track (15 min.)
C-C-RA	Reference blank tape (Normal)		Unrecorded tape (20 min.)
C-C-RF	Reference blank tape (CrO₂)		Unrecorded tape (20 min.)

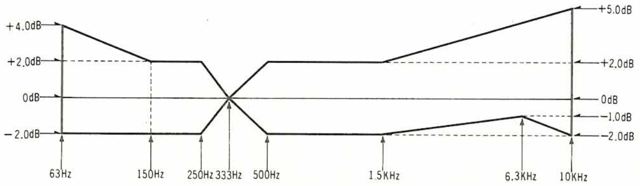
IV. MEASUREMENT & ADJUSTMENT METHOD

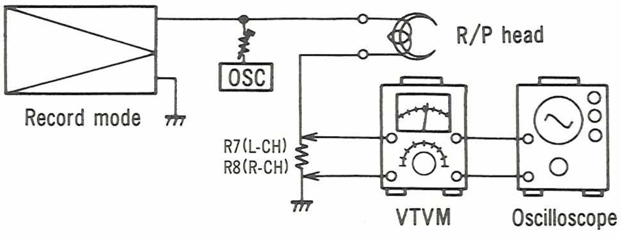
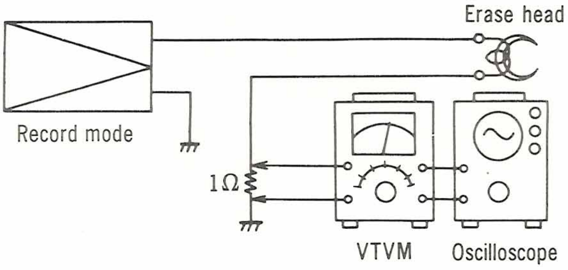
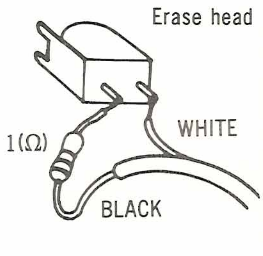
NOTE:

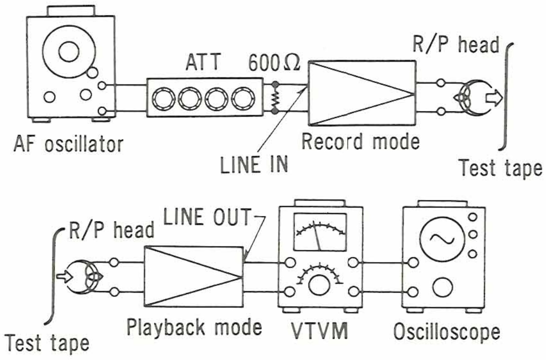
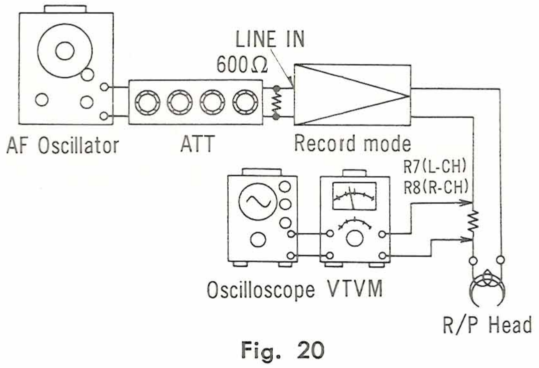
1. Make sure heads are clean.
2. Make sure capstan and pressure roller are clean.
3. Judgeable room temperature: 20±5°C (68±9°F)
4. Bias selector: Low
5. Dolby NR switch: OUT
6. Equalizer selector: 120μs
7. Output level control: MAX

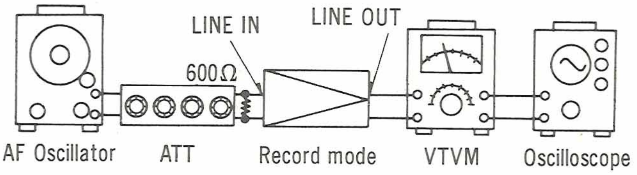
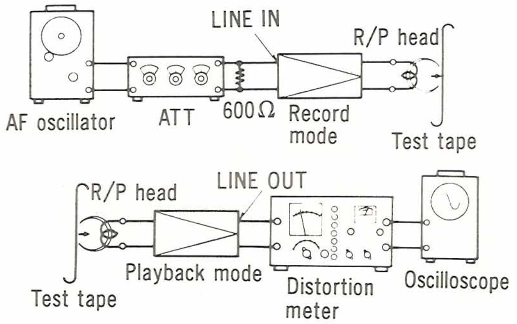
ITEM	MEASUREMENT & ADJUSTMENT	REMARKS
Pressure of pressure roller Equipment: * Tension gauge (max. 500 gr) 	1. Place UNIT into playback mode. 2. Hook the tension gauge to pressure roller lever and pull it in the direction of the arrow as shown in fig. 9. 3. Measure the tension at the moment when the pressure roller moves away from the capstan. Standard value: 390±60 gr Adjustment method Bend the part (A) of the pressure roller spring in either direction shown by the arrow until the correct pressure is attained.	* Playback mode  Tension gauge Capstan Pressure roller (A) Pressure roller spring Fig. 9
Takeup tension Equipment: * Cassette torque meter (SRK-CT or RP8063)	1. Mount cassette torque meter on UNIT. 2. Place UNIT into playback mode and read takeup torque. 3. Measure several times and determine the mean value. Standard value: 55±15 gr-cm If the measured value is not within standard, firstly clean the rotational parts of the mechanism with alcohol, and if it still is not within standard, make the following adjustment. Adjustment method Adjust by turning the plate spring attached in the takeup reel table (See fig. 10).	* Playback mode  Fig. 10
Head azimuth adjustment Equipment: * VTVM * Oscilloscope * Test tape (azimuth)···C-AA	Record/playback head adjustment 1. Test equipment connection is shown below.  LINE OUT Test tape Playback mode VTVM Oscilloscope Fig. 11 2. Play azimuth tape (C-AA, 6.3 kHz). 3. Adjust record/playback head angle adjustment screw (B) in fig. 12 so that output level at LINE OUT becomes maximum. 4. Measure both channels, and adjust levels for equal output. 5. After adjustment lock head adjustment screw with lacquer.	* Playback mode  Fig. 12

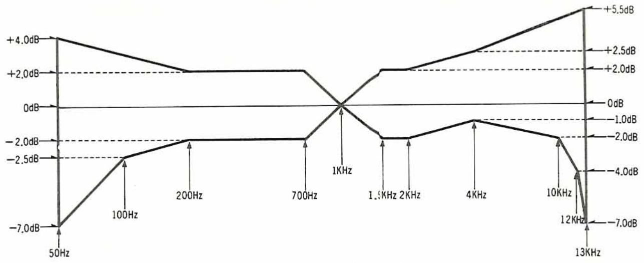
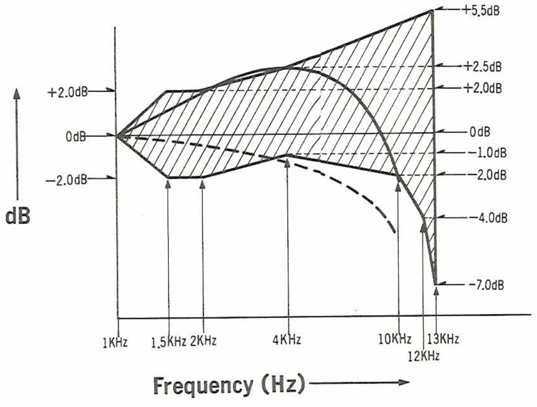
ITEM	MEASUREMENT & ADJUSTMENT	REMARKS
Tape speed Equipment: * Digital electronic counter or frequency counter (RP8067) * Test tape ··· C-WAT	**Tape speed accuracy** 1. Test equipment connection is shown below.  LINE OUT R/P head Test tape Playback mode Digital electric counter **Fig. 13** 2. Play test tape (C-WAT 3,000 Hz), and supply playback signal to frequency counter. 3. Measure this frequency. 4. On the basis of 3,000 Hz, determine value by following formula: $\text{Tape speed accuracy} = \frac{f-3,000}{3,000} \times 100\,(\%)$ where, f = measured value 5. Take measurement at middle section of tape. Standard value: ±1.5% **Adjustment method** 1. Play the test tape (middle). 2. Adjust the tape speed adjustment VR shown on page 18 so that frequency becomes 3,000 Hz. **Tape speed fluctuation** Make measurements in same manner as above (beginning, middle and end of tape), and determine difference between maximum and minimum values and calculate as follows: $\text{Tape speed fluctuation} = \frac{f_1-f_2}{3,000} \times 100\,(\%)$ f_1 = maximum value f_2 = minimum value Standard value: 1.5%	* Playback mode
Wow and flutter Equipment: * Wow meter * Test tape ··· C-WAT	1. Test equipment connection is shown below.  LINE OUT R/P head Test tape Playback mode Wow meter **Fig. 14** 2. Use wow test tape (3,000 Hz) and measure its playback signal on wow meter. 3. Wow and flutter is expressed in percentage and that measurement can be weighted by JIS network (WRMS). 4. Measure at middle section of test tape. Standard value: 0.10% (WRMS)	* Playback mode

ITEM	MEASUREMENT & ADJUSTMENT	REMARKS
Playback frequency response Equipment: * VTVM * Oscilloscope * Test tape··· C-FH	1. Test equipment connection is as same as "Head azimuth adjustment" but use the test tape (C-FH) instead of head azimuth tape (See fig. 11). 2. Place UNIT into playback mode. 3. Play frequency response test tape (C-FH). 4. Measure output level at 10kHz, 8kHz, 4kHz, 1kHz, 125Hz and 63Hz and compare output level with standard frequency 333Hz, at LINE OUT. 5. Make measurement for both channels. 6. Make sure that the measured value is within the range specified in the frequency response chart. Playback frequency response chart  Fig. 15 7. If measured value is not within standard, adjust the following points: Change the "Connection points" of the amplifier pattern, and then adjust the playback frequency response. ①If the high range (8～10kHz) decreases about −1～−1.5dB, short circuit connection points Ⓐ as shown in fig. 7. ②If the high range (8～10kHz) decreases about −1.5～−2dB, also short circuit connection points Ⓑ as shown in fig. 7.	* Playback mode
Playback gain Equipment: * VTVM * Oscilloscope * Test tape··· C-FH	1. Test equipment connection is shown in fig. 11. 2. Play standard recording level portion on test tape (C-FH 333Hz), and using VTVM measure the output level at LINE OUT jack. 3. Make measurement for both channels. Standard value: 0.42V (−7dB) Adjustment method 1. If measured value is not standard, adjust VR1 (L-CH), VR2 (R-CH) (See fig. 28 on page 17). 2. After adjustment, check "Playback frequency response" again.	* Playback mode
Playback S/N ratio Equipment: * VTVM * Oscilloscope * Test tape··· C-FH * Empty cassette	1. Test equipment connection is shown in fig. 11. 2. Play standard recording level test tape (C-FH 333Hz) and read output level on VTVM. Refer to "Playback gain adjustment". 3. Place empty cassette (which has been cut) and play again. 4. Measure noise level at this time using VTVM, and determine ratio of this level to test tape output signal voltage (333Hz). Standard value: Greater than 43dB An example calculation is shown below. A: Es=playback output signal voltage of test tape (333Hz) B: En=playback output noise level Es=0.42V (−7dB) En=0.003V (−50dB) $\text{S/N ratio} = \frac{\text{Es}}{\text{En}} = \frac{0.42\,\text{V}}{0.003\,\text{V}} = 140$ $20 \log_{10} 140 = 43\,\text{dB}$ $\text{S/N ratio} = \text{Es(dB)} - \text{En(dB)} = -7 - (-50) = 43\,\text{dB}$	* Playback mode

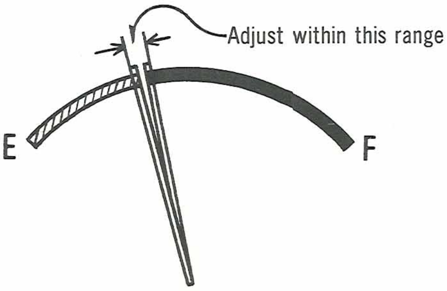
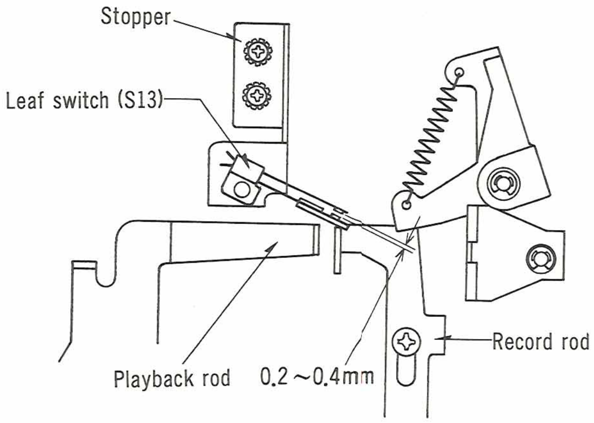
ITEM	MEASUREMENT & ADJUSTMENT	REMARKS
Bias current Equipment: * VTVM * Oscilloscope	1. Test equipment connection is shown below.  R/P head OSC Record mode R7(L-CH) R8(R-CH) VTVM Oscilloscope **Fig. 16** 2. Place UNIT into record mode, and bias selector switch to "LOW", position. 3. Read voltage on VTVM and calculate bias current by following formula: $$\text{Bias current (A)} = \frac{\text{Value read on VTVM (V)}}{10\ (\Omega)}$$ Standard value: 0.3±0.001 mA 4. Adjust L5 (L-CH) and L6 (R-CH) (See adjustment part location on page 17). 5. Then changing the bias selector to "HIGH", confirm that bias current become greater by 30% than that for normal.	* Record mode * Be sure the ground end of the meter is connected to the ground end of the resistor. * When bias current is adjusted on one channel only, note that bias current on the other channel may vary.
Erase current Equipment: * VTVM * Oscilloscope * Resistor (1Ω)	1. Connect 1Ω resistor between ground side terminal of the erase head ground lead wire removed (See fig. 18). 2. Connect VTVM to both ends of 1Ω resistor.  **Fig. 17** 3. Place UNIT into record mode, and measure voltage across the on resistor. 4. Determine erase current with the following formula: $$\text{Erase current (A)} = \frac{\text{Voltage across both ends of 1 }(\Omega)}{1\ (\Omega)}$$ Standard value: Bias LOW: 90±20 mA Bias HIGH: 120±30 mA	* Record mode  **Fig. 18**

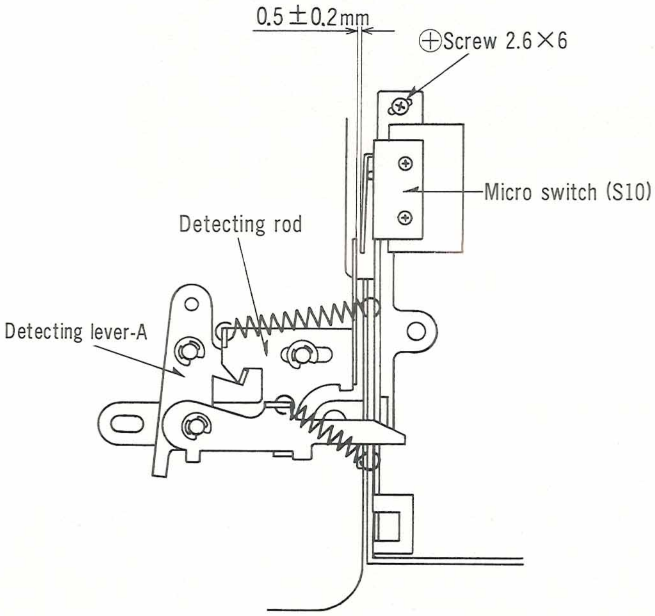
ITEM	MEASUREMENT & ADJUSTMENT	REMARKS
Overall gain Equipment: * AF oscillator * VTVM * ATT * Oscilloscope * Test tape (reference blank tape) ··· C-RA for Normal ··· C-RF for CrO2	1. Test equipment connection is shown in fig. 19.  ATT 600Ω R/P head AF oscillator Record mode LINE IN Test tape R/P head LINE OUT Test tape Playback mode VTVM Oscilloscope **Fig. 19** 2. Place UNIT into record mode, and bias selector to "LOW", and EQ. selector to "120μS". 3. Supply 1 kHz (−24 dB) from AF oscillator, through ATT, to signal LINE IN. 4. Adjust ATT until monitor level at LINE OUT becomes 0.42 V (−7 dB). 5. Using test tape (C-RA), make recording. 6. Playback recorded tape, and make sure the value at LINE OUT on VTVM becomes 0.42 V. 7. If measured value is not 0.42 V, adjust VR7 (L-CH), VR8 (R-CH) (See fig. 28 on page 17). 8. Repeat from step (2). 9. For CrO2 bias selector to "HIGH", and EQ. selector to "70μS" change test tape to (C-RF), and take the same steps for normal but to adjust, use VR9 (L-CH) and VR10 (R-CH). (See fig. 28 on page 17). How to check recording current  LINE IN 600Ω AF Oscillator ATT Record mode R7(L-CH) R8(R-CH) Oscilloscope VTVM R/P Head **Fig. 20** 1. Test equipment connection is shown in fig. 20. 2. Stop bias oscillation by unsoldering point L302 shown in AMP circuit board on page 20. 3. Supply 1 kHz signal (−24 dB) again and adjust ATT until monitor level at LINE OUT becomes 0.42 V. 4. Measure voltage and then calculate recording current by formura given below. $$\text{Recording current} = \frac{\text{Value read on VTVM (V)}}{10\ (\Omega)}$$ Standard value: 40±5μA 5. At this time, set the bias selector to "HIGH", and EQ. selector to "70μS" and confirm variation of recording current. Standard value: 60±5μA	* Record/playback mode * LINE IN level control ··· MAX * Standard input level: MIC········· −72±4 dB LINE IN ··· −24±4 dB

ITEM	MEASUREMENT & ADJUSTMENT	REMARKS
Level meter Equipment: * VTVM * Oscilloscope * AF oscillator * ATT	When standard recording level is supplied 1. Test equipment connection is shown in fig. 21.  LINE IN LINE OUT 600Ω AF Oscillator ATT Record mode VTVM Oscilloscope Fig. 21 2. Set the bias selector to "LOW" and the EQ. selector to "120μS". 3. Supply 1 kHz signal (−24 dB) from AF oscillator, through ATT, to LINE IN (L-CH) jack. 4. Adjust ATT until monitor level at LINE OUT (L-CH) jack becomes 0.42 V (−7 dB) and confirm that the level meter indicates 0 VU position. 5. If in the above condition, the level meter doesn't indicate 0 VU position, change the "Connection points" of the amplifier pattern, and make the adjustment. ① If the indication of the left channel meter is below −1.5 dB, short circuit connection point Ⓒ as shown in fig. 7. ② If the indication is still insufficient by shorting connection point Ⓒ, short circuit connection point Ⓓ also as shown in fig. 7. 6. Adjust VR11 so that the right meter will indicate the same value as the left meter. (See fig. 28 on page 17).	* Record mode
Overall distortion Equipment: * Distortion meter * AF oscillator * ATT * Oscilloscope * Test tape ··· C-RA (reference blank tape)	1. Test equipment connection is shown in fig. 22.  LINE IN R/P head AF oscillator ATT 600Ω Record mode Test tape R/P head LINE OUT Playback mode Test tape Distortion meter Oscilloscope Fig. 22 2. Supply 1 kHz signal to LINE IN and adjust ATT so that output level at LINE OUT indicates 0.42 V (−7 dB). 3. Make recording. 4. Playback and measure distortion factor of output signal. 5. When the distortion factor does not satisfy the standard, check the bias current. When the bias current is lower than standard, distortion will increase. Care should be exercised in the adjustment because the bias current also has an influence on the overall frequency response. Refer to "The overall frequency response" and "The bias current adjustment". Standard value: Less than 3.0% (Normal) Less than 3.5% (CrO_2)	* LINE IN level control ···MAX * Bias selector ········· LOW * EQ. selector ······ 120μS (for Normal tape) * Bias selector ········· HIGH * EQ. selector ········· 70μS (for CrO_2 tape)

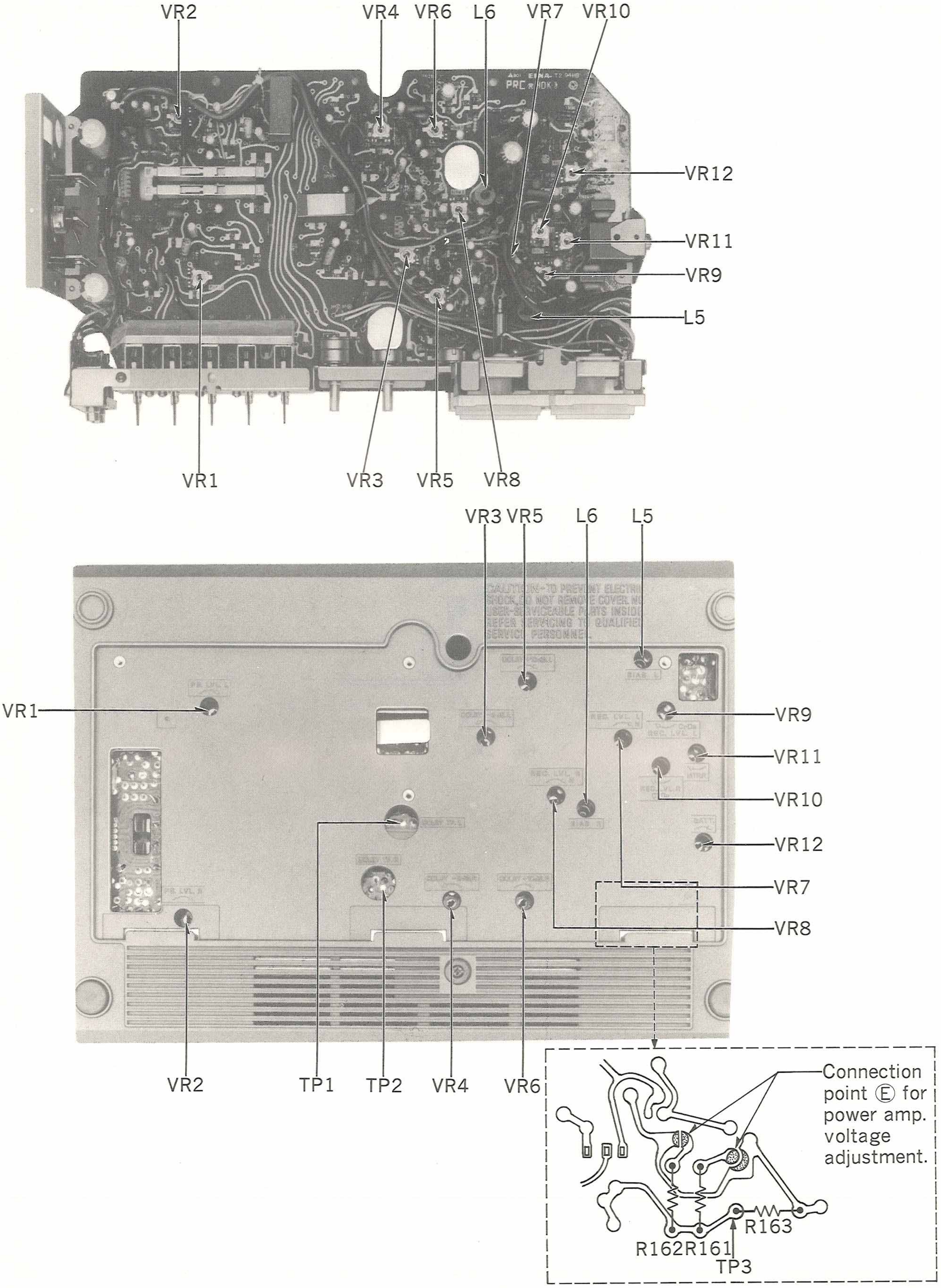
ITEM	MEASUREMENT & ADJUSTMENT	REMARKS
Overall frequency response Equipment: * VTVM * AF oscillator * ATT * Test tape (reference blank tape) …C-RA for Normal …C-RF for CrO₂	**Note:** Before measuring, and adjusting, make sure of the playback frequency response (For the method of measurement, please refer to the playback frequency response). 1. Test equipment connection is shown in fig. 19. 2. Load reference blank test tape and place UNIT into record mode. 3. Supply 1 kHz signal from AF oscillator through ATT to LINE IN. 4. Adjust ATT so that input level is −20 dB below standard recording level (standard recording level = 0 VU). 5. At this time, LINE OUT level indicates 0.042 V. 6. Record each frequency 40 Hz, 100 Hz, 200 Hz, 500 Hz, 1 kHz, 2 kHz, 3 kHz, 10 kHz, 12 kHz and 13 kHz at the same level. 7. Playback and express in dB the difference between playback output level of each frequency based on playback output level of 1 kHz. 8. Make sure that the measured value is within the range specified in the overall frequency response chart. 9. Set the bias selector to "HIGH", and the EQ. selector to "70μS". 10. Measure as same as manner above. 11. Make sure that the measured value is within the range specified in the overall frequency response chart (See fig. 23). Overall frequency response chart (Normal & CrO₂)  **Fig. 23**	* Record/playback mode * Record level control …MAX * Bias selector ……LOW * EQ. selector ……120μS (for Normal tape) * Bias selector ………HIGH * EQ. selector ………70μS (for CrO₂ tape)
Overall frequency response (As a standard for adjustment)	**Adjustment 1—Using bias current** 1. When the frequency response between the middle- and high-frequency range becomes higher than the standard value, as shown by the solid line in fig. 24 increase the bias current by turning L5 (L-CH), L6 (R-CH). 2. When it becomes lower, as shown by dotted line, reduce the bias current by turning L5 (L-CH), L6 (R-CH). (See fig. 28 on page 17).  **Fig. 24**	

ITEM	MEASUREMENT & ADJUSTMENT	REMARKS
	Note: 1. For adjustment when the bias current is lower than the standard value 0.29mA, the bias current beyond this point may worsen the distortion factor. 2. For the method of bias current measurement, refer to "Bias current adjustment" on page 10.	
Overall S/N ratio Equipment: * VTVM * AF oscillator * ATT * Oscilloscope * Test tape··· C-RA (reference blank tape)	1. Test equipment connection is shown in fig. 19. 2. Supply 1 kHz signal to LINE IN and adjust ATT so that output level at LINE OUT indicates 0.42 V (−7 dB). 3. Make recording. 4. Make another recording without supplying signal (disconnect input plug to LINE IN). 5. Rewind to recorded part and playback. 6. Measure output signal level and no signal level (noise), and determine the ratio in decibels (dB). 7. The value is difference between "Playback S/N and overall S/N", but for decibel calculation refer to "Playback S/N measurement" on page 9. Standard value: Greater than 40 dB (without NAB filter)	* Record/playback mode * LINE IN level control ···MAX * Erase the tape with a bulk tape eraser. * Bias selector ·········LOW * EQ. selector ······ 120μS
Dolby NR circuit Equipment: * VTVM * AF oscillator * ATT * Oscilloscope	1. Place UNIT into record mode, set the Dolby NR switch to OUT position and supply to LINE IN to obtain −34.5 dB at TP1 (L-CH), TP2 (R-CH) (frequency 5 kHz). 2. Confirm that the value at IN position is 8 dB greater than the value at OUT position of Dolby NR switch. 3. When it is not in condition above, adjust as follows. 4. Set VR3 (L-CH), VR4 (R-CH) to maximum. 5. Set the Dolby NR switch to IN position. 6. At this time adjust VR5 (L-CH), VR6 (R-CH) so that the reading of VTVM become 10 dB greater than the value in step (1) above. 7. Adjusting VR3 (L-CH), VR4 (R-CH), make the reading of VTVM become 2 dB smaller than the value obtainted through the adjustment in step (6) above. (See adjustment parts location on page 17).	* Record mode * LINE IN level control ···MAX * Stop the bias oscillation by unsoldering point L302 shown in circuit board on page 20.

ITEM	MEASUREMENT & ADJUSTMENT	REMARKS
Battery meter Equipment: * DC voltage supply	1. Place UNIT into record and playback mode. 2. Set the VR604 (S12) power amplifier volume to the OFF position. 3. Apply DC 9.1 V to the DC IN jack. 4. Set the S6 battery check switch to the IN position. 5. Adjust the VR12 battery meter adjustment VR, adjusting so that the meter indication needle moves to the position shown in fig. 25 below. (See fig. 28 on page 17).  Fig. 25	* Playback mode * Record/playback mode
Setting of power amplifier intermediate potential Equipment: * Tester	1. Set the VR604 (S12) power amplifier volume to the ON position. 2. Connect the measuring instrument between the test point (TP3) and earth, and confirm that an intermediate voltage of 7 V (+0.5 V, −0 V) is present. 3. If intermediate voltage does not reach 7 V, short circuit connection point Ⓔ as shown in fig. 28, and adjust so that the value is within the standard.	
Adjustment of leaf switch for playback	1. Adjust the playback leaf switch so that its clearance will be 0.2 ~ 0.4 mm, as shown in the figure below, when, in the condition that the accidental-erase-prevention lever is locked (the record button is not locked), the record button is pushed. 2. After adjustment, secure by locking the screw. Note: Be sure that the playback leaf switch adjustment is made only after first securing the stopper.  Stopper Leaf switch (S13) Record rod Playback rod 0.2 ~ 0.4mm Fig. 26	

ITEM	MEASUREMENT & ADJUSTMENT	REMARKS
Micro-switch (S10) mounting method	1. Lock the record button and playback button. 2. As shown in the figure below, attach the micro-switch holding plate so that, with the detection lever assembly and detection rod engaged, the clearance between the detection rod and the actuator of the micro-switch is 0.5±0.2 mm. Note: The micro-switch can be attached by pushing the actuator with a finger, illuminating the light-emitting diode, and then resetting the actuator gently and attaching the micro-switch by stopping at the point where the light-emitting diode extinguishes.  0.5 ±0.2mm ⊕Screw 2.6×6 Micro switch (S10) Detecting rod Detecting lever-A Fig. 27	

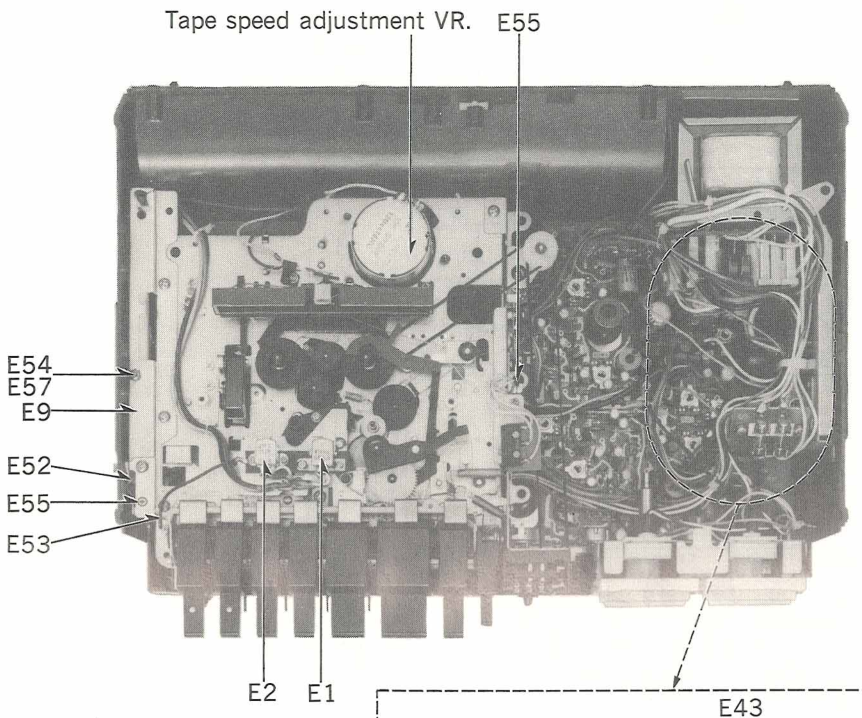
ADJUSTMENT PARTS LOCATION

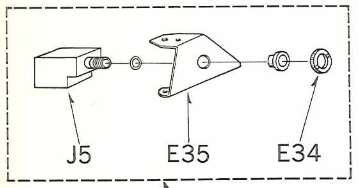

VR2
VR4
VR6
L6
VR7
VR10
VR12
VR11
VR9
L5
VR1
VR3
VR5
VR8
VR3
VR5
L6
L5
VR1
VR9
VR11
VR10
VR12
VR7
VR8
VR2
TP1
TP2
VR4
VR6
R163
R162
R161
TP3

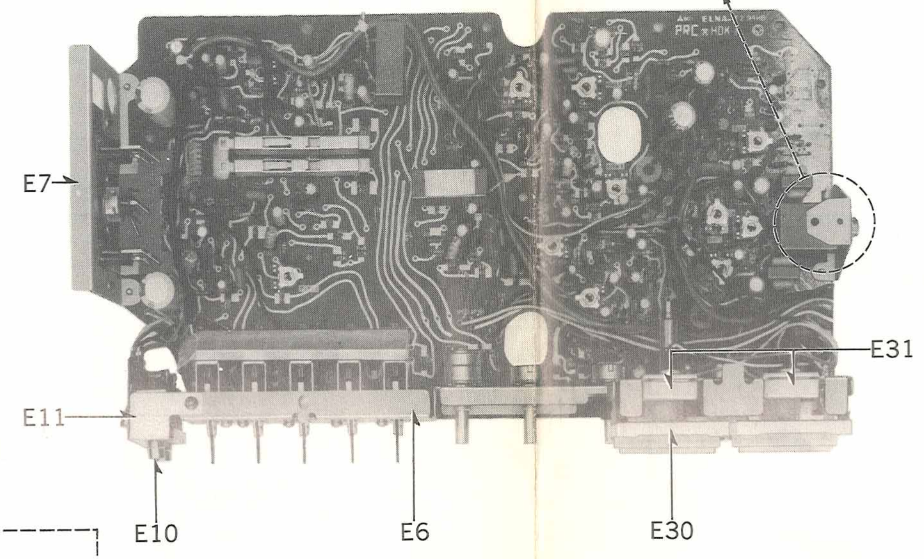
Connection point Ⓔ for power amp. voltage adjustment.

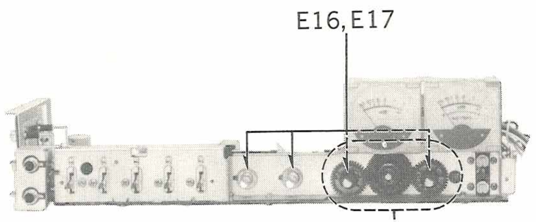
Fig. 28

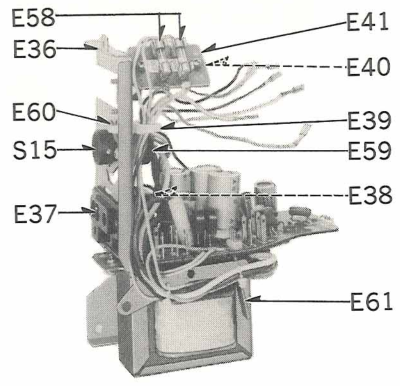
ELECTRICAL PARTS LOCATION

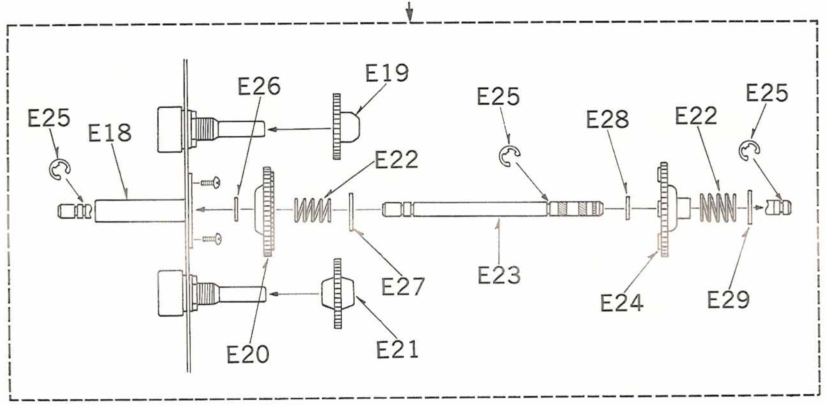

Tape speed adjustment VR.
E55
E54
E57
E9
E52
E55
E53
E2
E1




E7
E11
E10
E6
E30
E31




E58
E36
E60
S15
E37
E41
E40
E39
E59
E38
E61


E25
E18
E26
E19
E25
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E22
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E22
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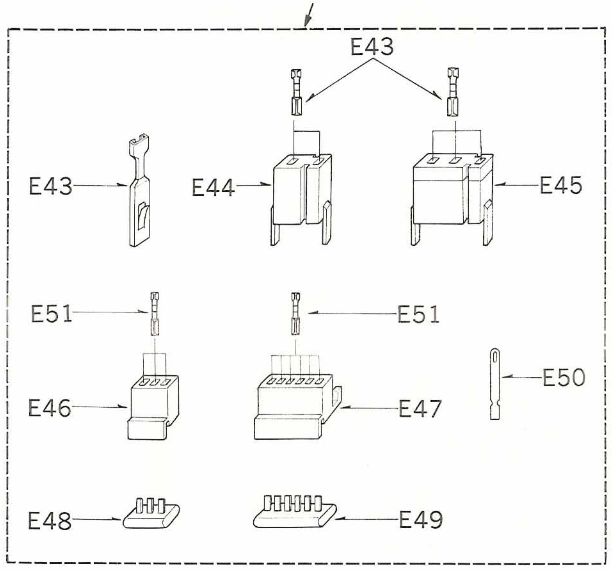
E29
E20
E21


E43
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E48
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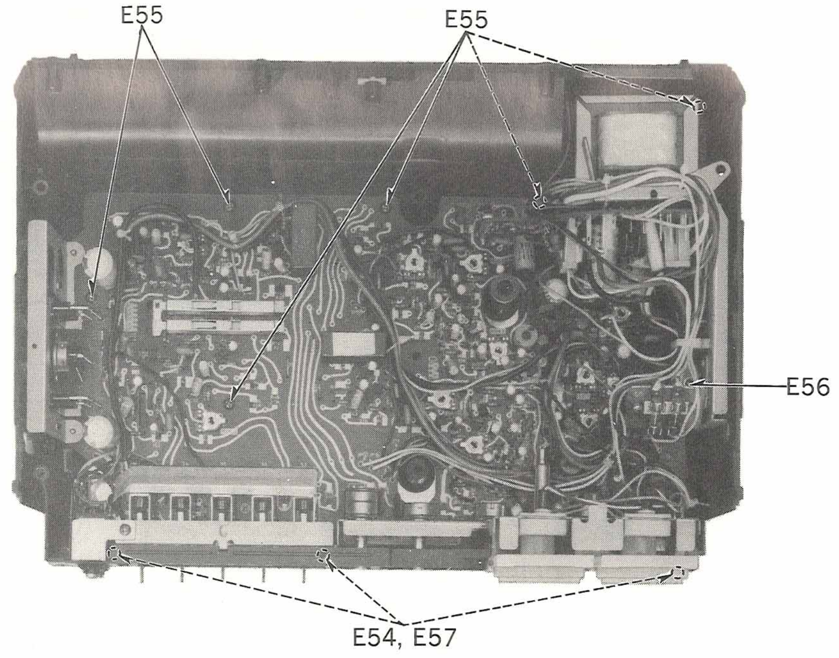
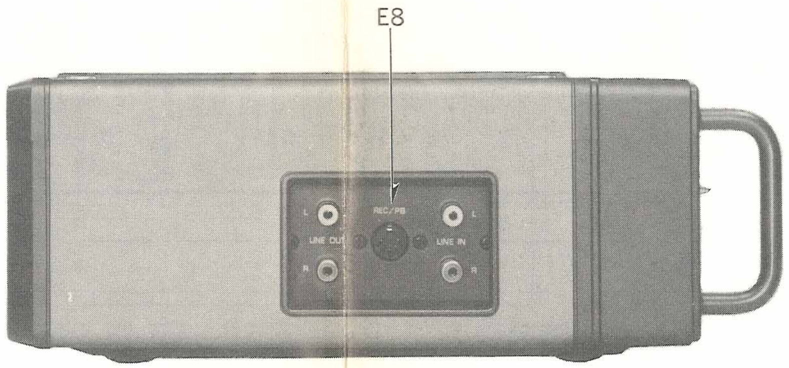
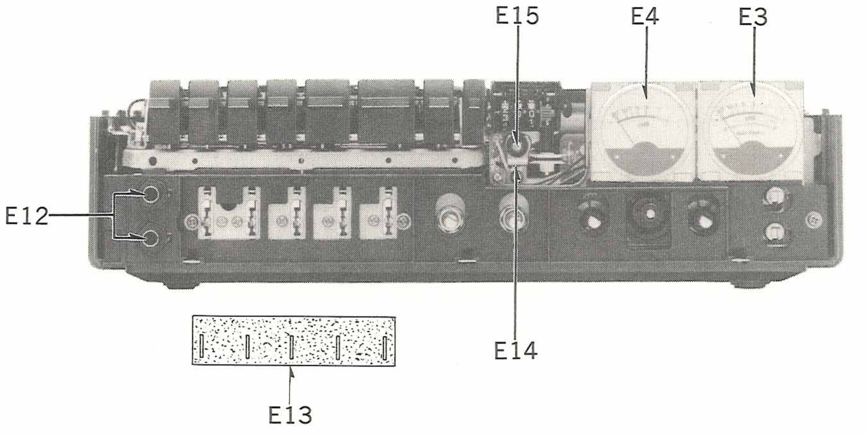
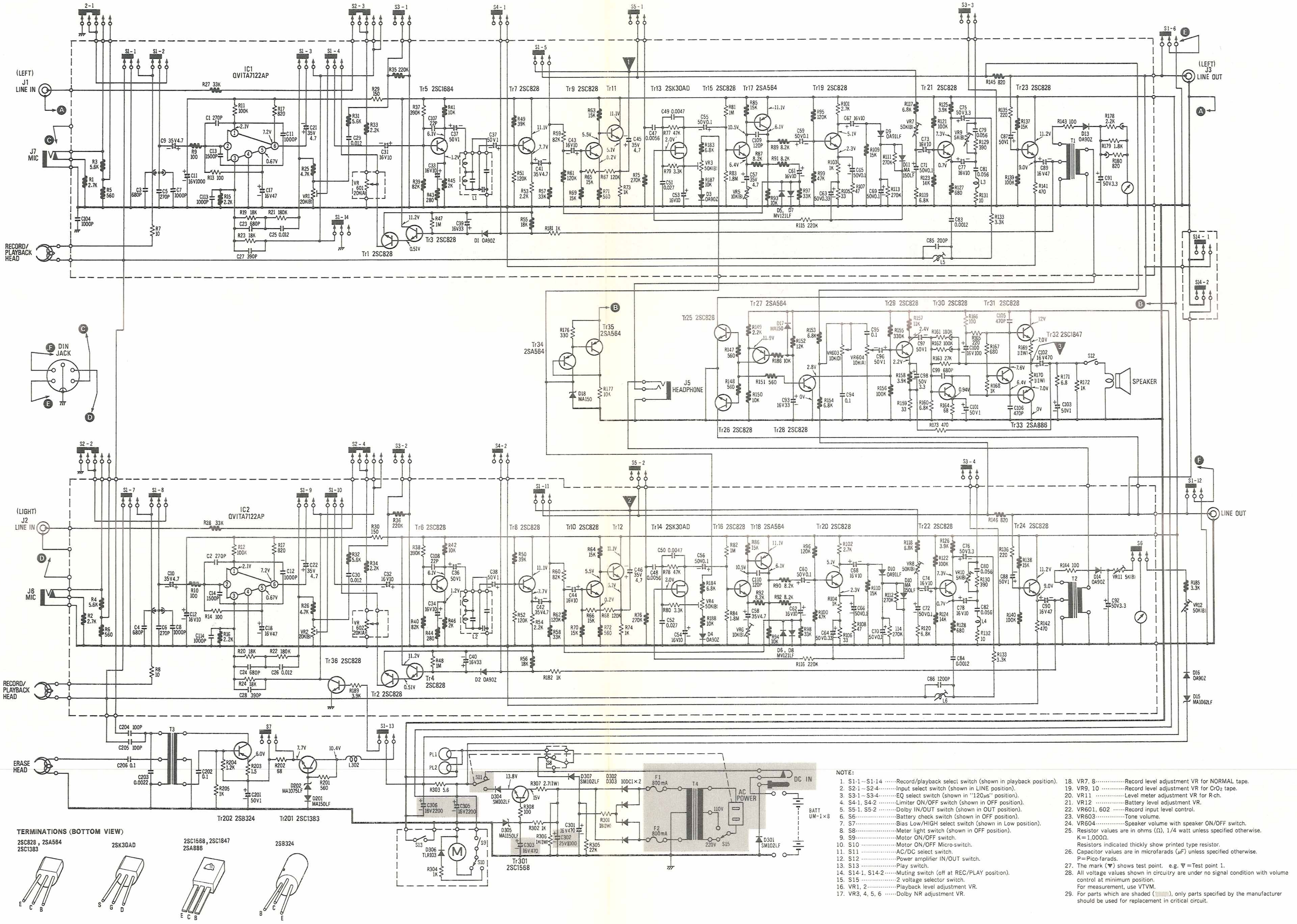

E55
E55
E56
E54, E57




E15
E4
E3
E12
E14
E13

SCHEMATIC DIAGRAM MODEL RS-646DS-D

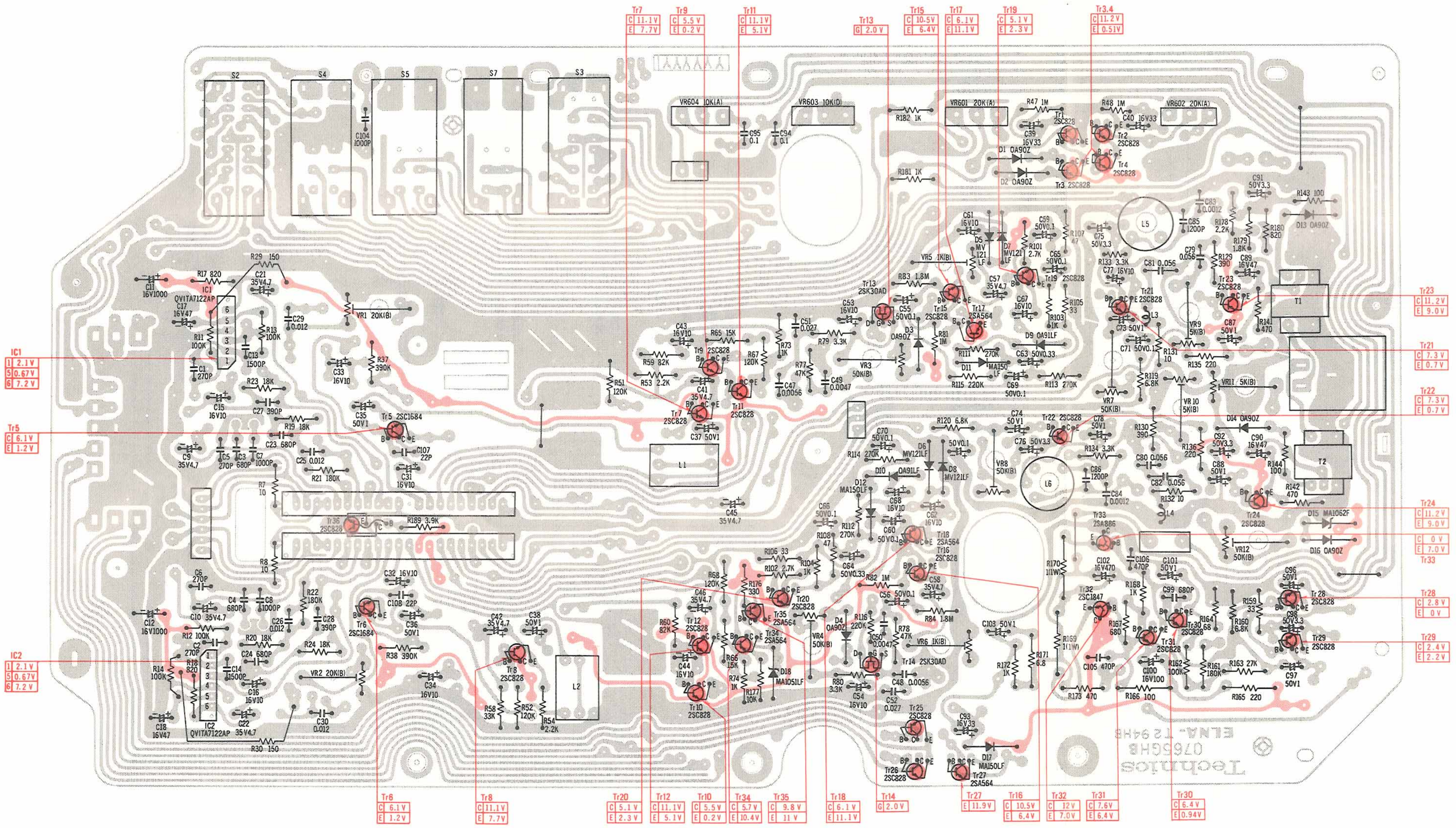

(LEFT)
J1
LINE IN
J7
MIC
RECORD/
PLAYBACK
HEAD
IC1
QVITA7122AP
Tr1 2SC828
Tr3 2SC828
Tr5 2SC1684
Tr7 2SC828
Tr9 2SC828
Tr11
Tr13 2SK30AD
Tr15 2SC828
Tr17 2SA564
Tr19 2SC828
Tr21 2SC828
Tr23 2SC828
(LEFT)
J3
LINE OUT
DIN
JACK
Tr34
2SA564
Tr35
2SA564
Tr25 2SC828
Tr27 2SA564
Tr29 2SC828
Tr30 2SC828
Tr31 2SC828
Tr32 2SC1847
Tr26 2SC828
Tr28 2SC828
Tr33 2SA886
J5
HEADPHONE
SPEAKER
(LIGHT)
J2
LINE IN
J8
MIC
IC2
QVITA7122AP
Tr2 2SC828
Tr4 2SC828
Tr6 2SC828
Tr8 2SC828
Tr10 2SC828
Tr12
Tr14 2SK30AD
Tr16 2SC828
Tr18 2SA564
Tr20 2SC828
Tr22 2SC828
Tr24 2SC828
Tr36 2SC828
LINE OUT
ERASE
HEAD
Tr202 2SB324
Tr201 2SC1383
Tr301
2SC1568
DC IN
AC
POWER
BATT
UM-1×8
2SC828, 2SA564
2SC1383
E C B
2SK30AD
S G D
2SC1568, 2SC1847
2SA886
E C B
2SB324
B C E

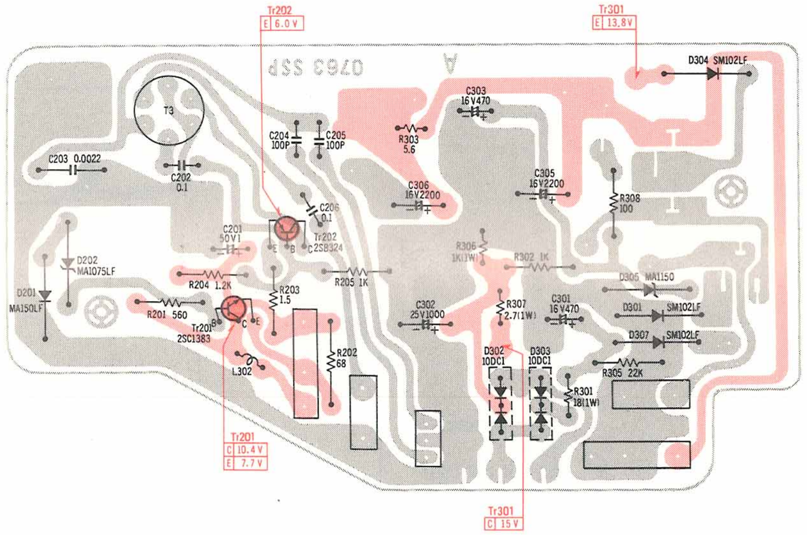
TERMINATIONS (BOTTOM VIEW)

NOTE:

1. S1-1～S1-14 ······Record/playback select switch (shown in playback position).
2. S2-1～S2-4·········Input select switch (shown in LINE position).
3. S3-1～S3-4·········EQ select switch (shown in "120μs" position).
4. S4-1, S4-2 ·········Limiter ON/OFF switch (shown in OFF position).
5. S5-1, S5-2 ·········Dolby IN/OUT switch (shown in OUT position).
6. S6·····················Battery check switch (shown in OFF position).
7. S7·····················Bias Low/HIGH select switch (shown in Low position).
8. S8·····················Meter light switch (shown in OFF position).
9. S9·····················Motor ON/OFF switch.
10. S10 ··················Motor ON/OFF Micro-switch.
11. S11 ··················AC/DC select switch.
12. S12 ··················Power amplifier IN/OUT switch.
13. S13 ··················Play switch.
14. S14-1, S14-2······Muting switch (off at REC/PLAY position).
15. S15 ··················2 voltage selector switch.
16. VR1, 2···············Playback level adjustment VR.
17. VR3, 4, 5, 6 ······Dolby NR adjustment VR.
18. VR7, 8···············Record level adjustment VR for NORMAL tape.
19. VR9, 10 ············Record level adjustment VR for CrO_2 tape.
20. VR11 ···············Level meter adjustment VR for R-ch.
21. VR12 ···············Battery level adjustment VR.
22. VR601, 602 ······Record input level control.
23. VR603···············Tone volume.
24. VR604···············Speaker volume with speaker ON/OFF switch.
25. Resistor values are in ohms (Ω), 1/4 watt unless specified otherwise.
    K=1,000Ω.
    Resistors indicated thickly show printed type resistor.
26. Capacitor values are in microfarads (μF) unless specified otherwise.
    P=Pico-farads.
27. The mark (▼) shows test point. e.g. ▼ =Test point 1.
28. All voltage values shown in circuitry are under no signal condition with volume control at minimum position.
    For measurement, use VTVM.
29. For parts which are shaded (▨), only parts specified by the manufacturer should be used for replacement in critical circuit.

CIRCUIT BOARD

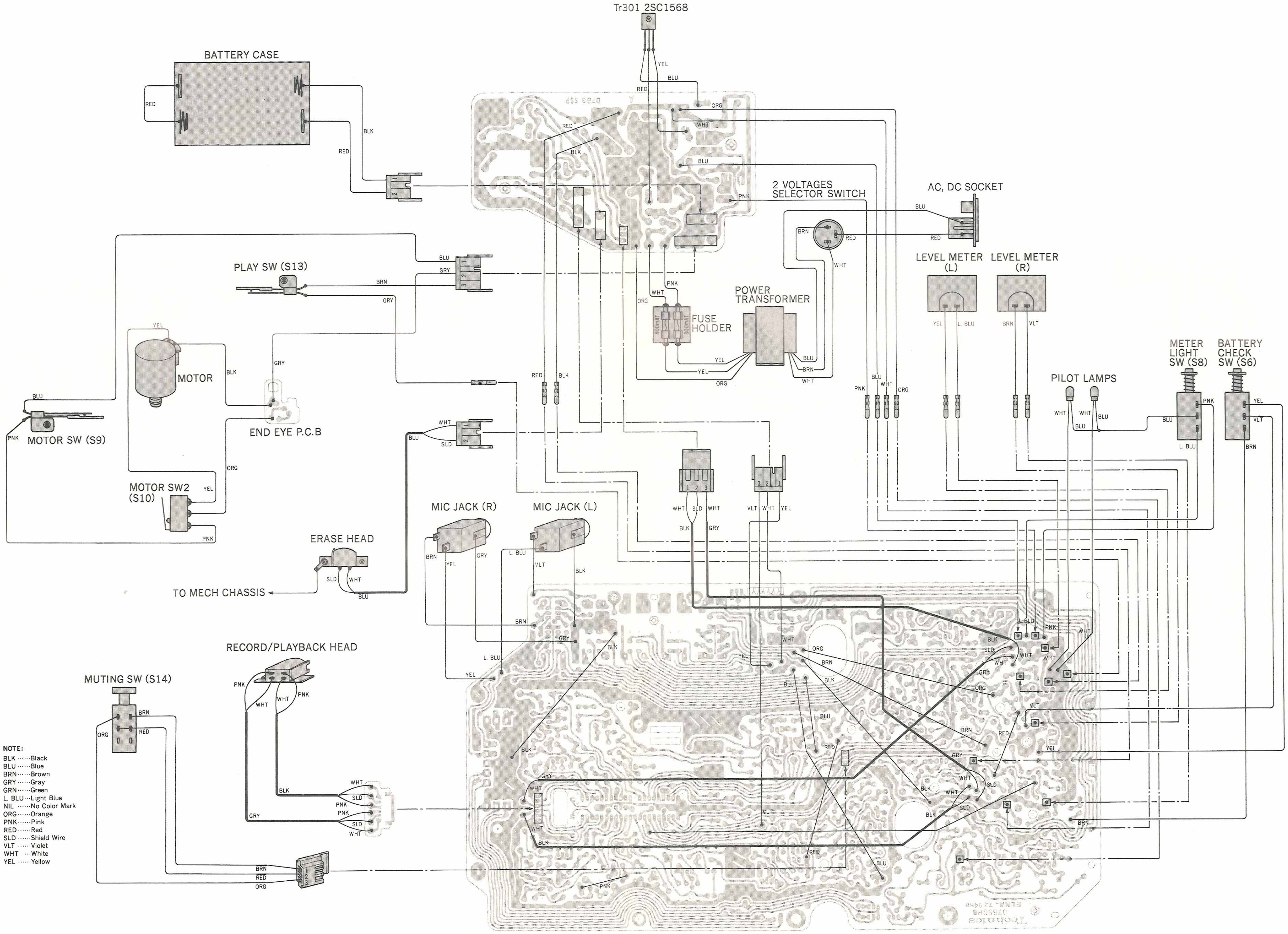

Tr7 C 11.1V E 7.7V
Tr9 C 5.5V E 0.2V
Tr11 C 11.1V E 5.1V
Tr13 G 2.0V
Tr15 C 10.5V E 6.4V
Tr17 C 6.1V E 11.1V
Tr19 C 5.1V E 2.3V
Tr3.4 C 11.2V E 0.51V
IC1 1 2.1V 5 0.67V 6 7.2V
Tr5 C 6.1V E 1.2V
IC2 1 2.1V 5 0.67V 6 7.2V
Tr23 C 11.2V E 9.0V
Tr21 C 7.3V E 0.7V
Tr22 C 7.3V E 0.7V
Tr24 C 11.2V E 9.0V
C 0V E 7.0V Tr33
Tr28 C 2.8V E 0V
Tr29 C 2.4V E 2.2V
Tr6 C 6.1V E 1.2V
Tr8 C 11.1V E 7.7V
Tr20 C 5.1V E 2.3V
Tr12 C 11.1V E 5.1V
Tr10 C 5.5V E 0.2V
Tr34 C 5.7V E 10.4V
Tr35 C 9.8V E 11V
Tr18 C 6.1V E 11.1V
Tr14 G 2.0V
Tr27 E 11.9V
Tr16 C 10.5V E 6.4V
Tr32 C 12V E 7.0V
Tr31 C 7.8V E 6.4V
Tr30 C 6.4V E 0.94V
Technics


Tr202 E 6.0V
Tr301 E 13.8V
Tr201 C 10.4V E 7.7V
Tr301 C 15V
0763 SSP

NOTE:

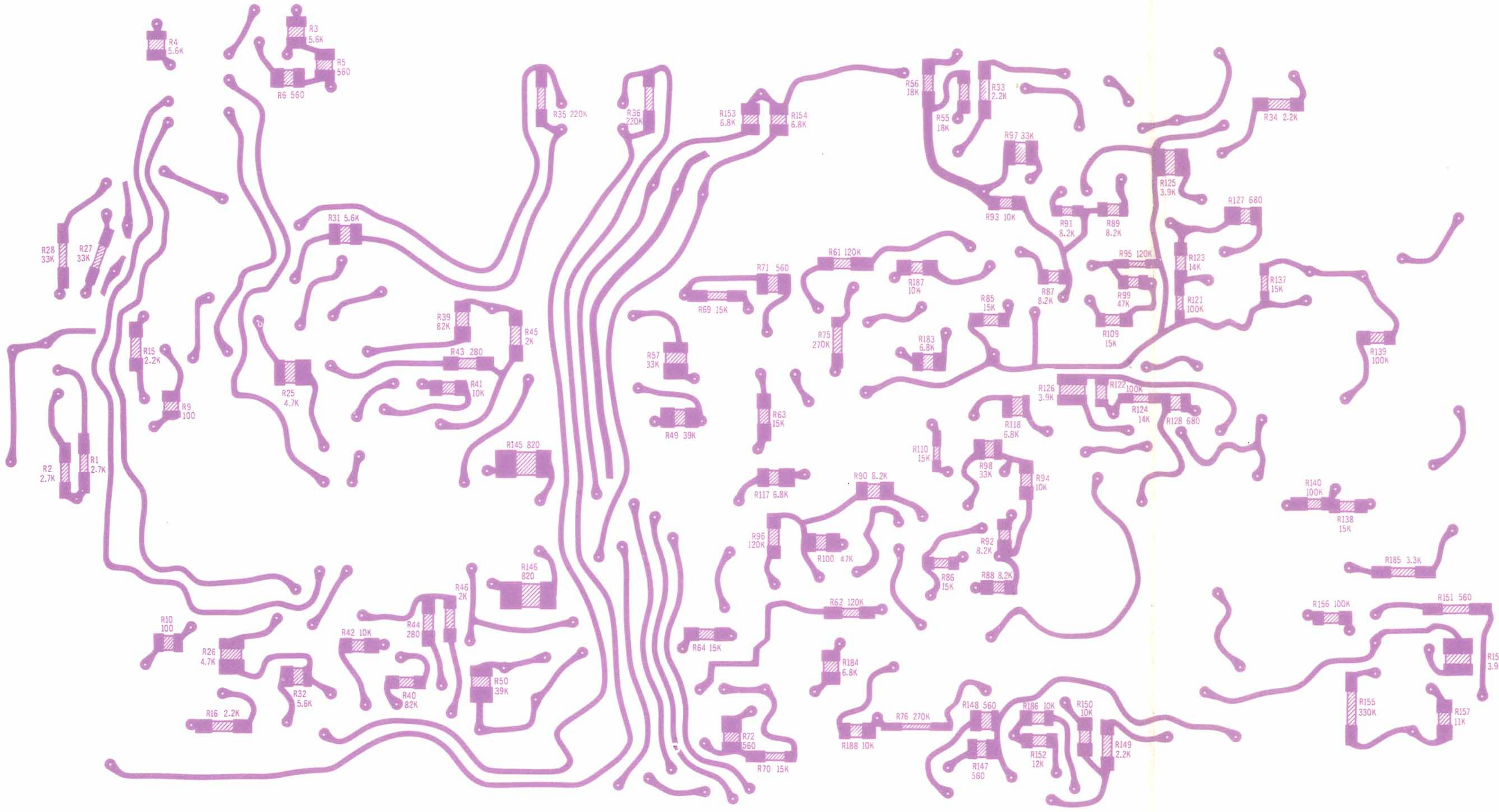
The circuit shown in red on the conductor is B circuit.
Values indicated in ▭ are DC voltage between the chassis and electrical parts.

WIRING CONNECTION DIAGRAM MODEL RS-646DS-D


Tr301 2SC1568
BATTERY CASE
2 VOLTAGES SELECTOR SWITCH
AC, DC SOCKET
PLAY SW (S13)
POWER TRANSFORMER
FUSE HOLDER
800mAT
LEVEL METER (L)
LEVEL METER (R)
MOTOR
END EYE P.C.B
MOTOR SW (S9)
METER LIGHT SW (S8)
BATTERY CHECK SW (S6)
PILOT LAMPS
MOTOR SW2 (S10)
MIC JACK (R)
MIC JACK (L)
ERASE HEAD
TO MECH CHASSIS
RECORD/PLAYBACK HEAD
MUTING SW (S14)
BLK
BLU
BRN
GRY
L. BLU
ORG
PNK
RED
SLD
VLT
WHT
YEL
Technics

NOTE:

BLK	Black
BLU	Blue
BRN	Brown
GRY	Gray
GRN	Green
L. BLU	Light Blue
NIL	No Color Mark
ORG	Orange
PNK	Pink
RED	Red
SLD	Shield Wire
VLT	Violet
WHT	White
YEL	Yellow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R3 5.6K
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R6 560
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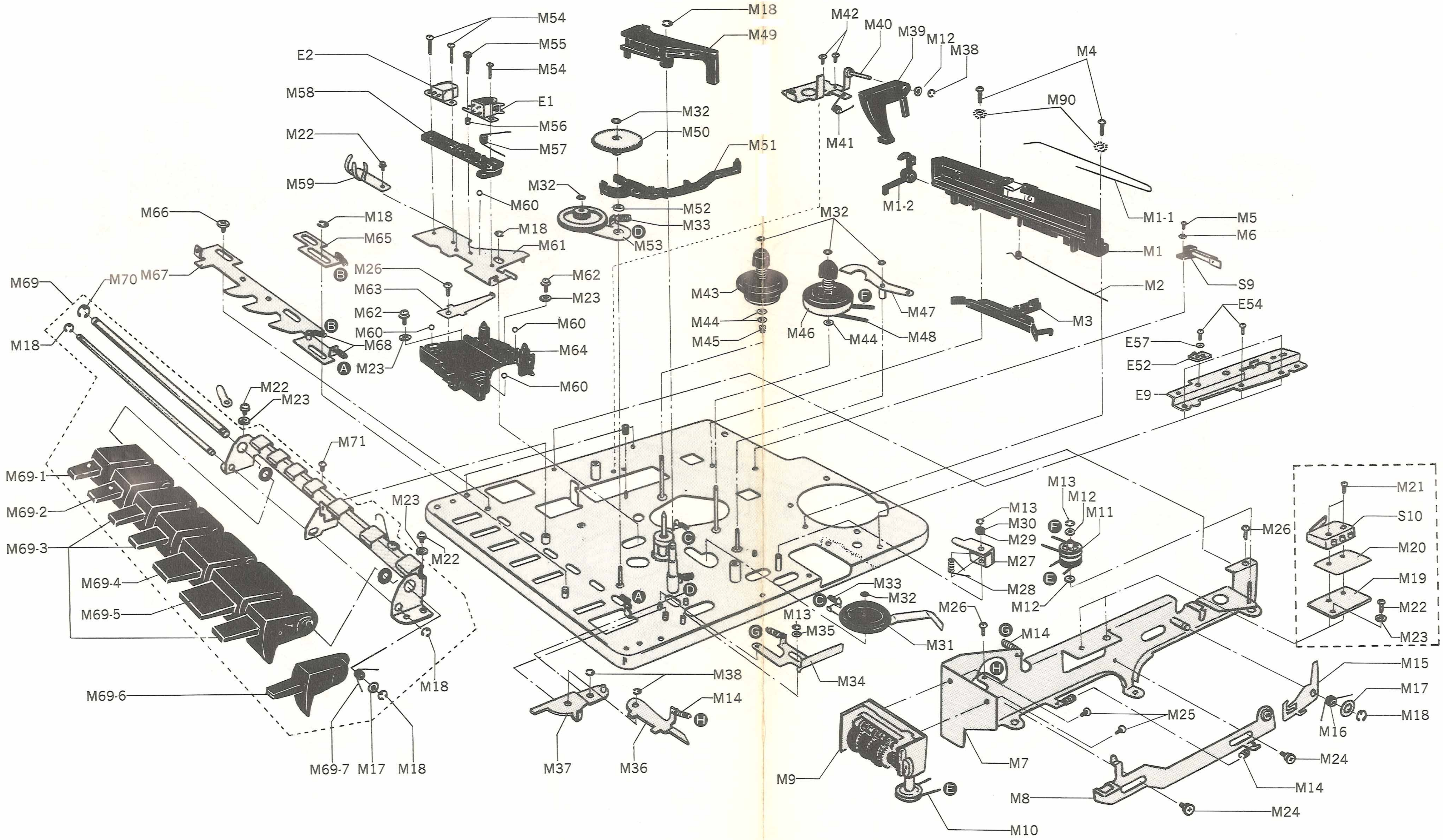
R36 220K
R153 6.8K
R154 6.8K
R56 18K
R55 18K
R33 2.2K
R97 33K
R34 2.2K
R125 3.9K
R93 10K
R91 8.2K
R89 8.2K
R127 680
R28 33K
R27 33K
R31 5.6K
R71 560
R69 15K
R61 120K
R187 10K
R95 120K
R123 14K
R137 15K
R87 8.2K
R99 47K
R121 100K
R85 15K
R39 82K
R45 2K
R43 280
R57 33K
R75 270K
R183 6.8K
R109 15K
R139 100K
R15 2.2K
R25 4.7K
R41 10K
R9 100
R126 3.9K
R122 100K
R124 14K
R128 680
R49 39K
R63 15K
R118 6.8K
R110 15K
R98 33K
R94 10K
R2 2.7K
R1 2.7K
R145 820
R117 6.8K
R90 8.2K
R140 100K
R138 15K
R96 120K
R100 47K
R92 8.2K
R146 820
R46 2K
R86 15K
R88 8.2K
R185 3.3K
R62 120K
R156 100K
R151 560
R10 100
R26 4.7K
R42 10K
R44 280
R64 15K
R184 6.8K
R158 3.9K
R32 5.6K
R40 82K
R50 39K
R16 2.2K
R72 560
R70 15K
R188 10K
R76 270K
R148 560
R186 10K
R150 10K
R149 2.2K
R147 560
R152 12K
R155 330K
R157 11K

EXPLODED VIEWS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M32
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M90
M41
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M32
M60
M1-2
M1-1
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M32
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M69-1
M69-2
M69-3
M23
M22
C
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M69-4
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M13
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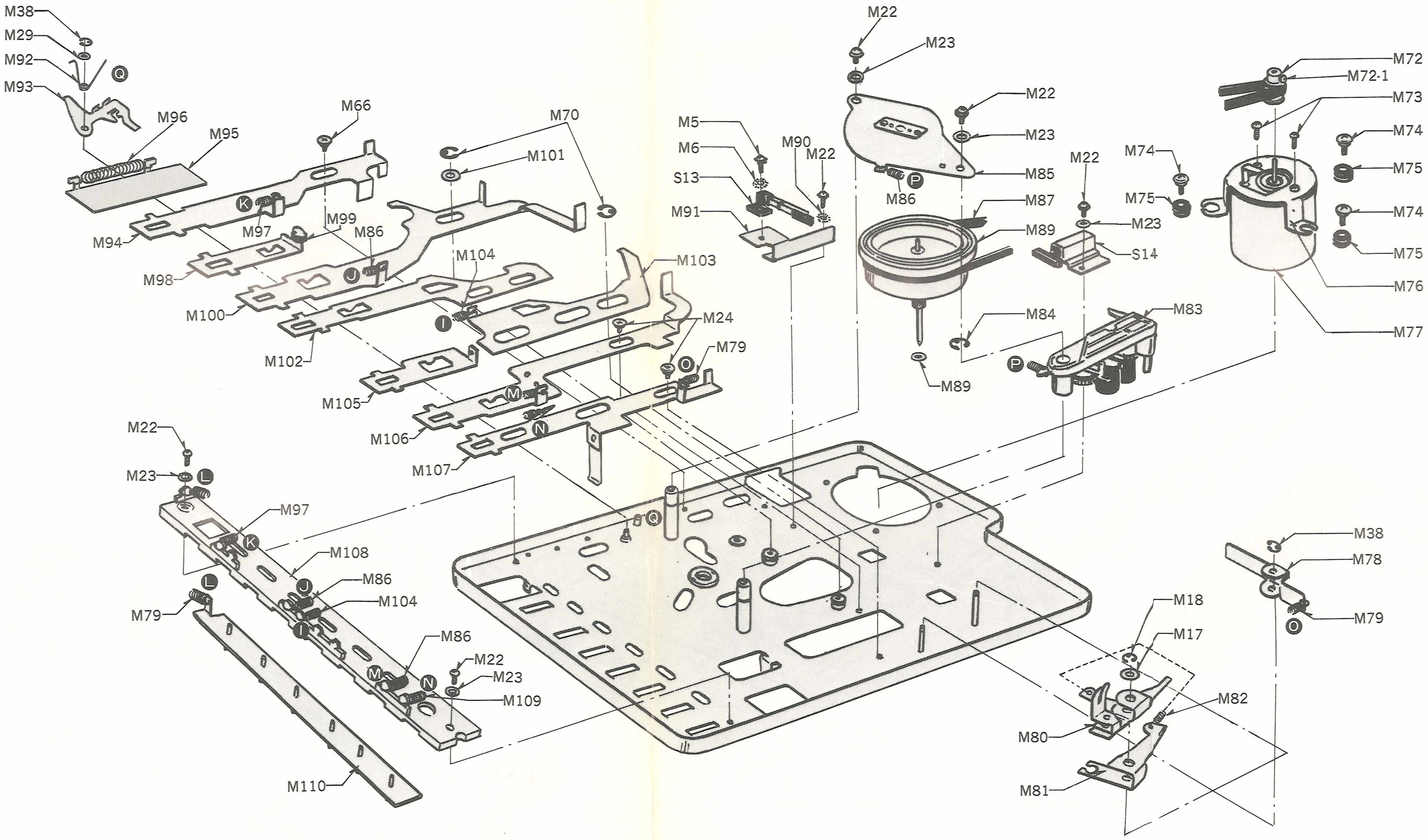
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M84
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M83
M22
M23
S14
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M72-1
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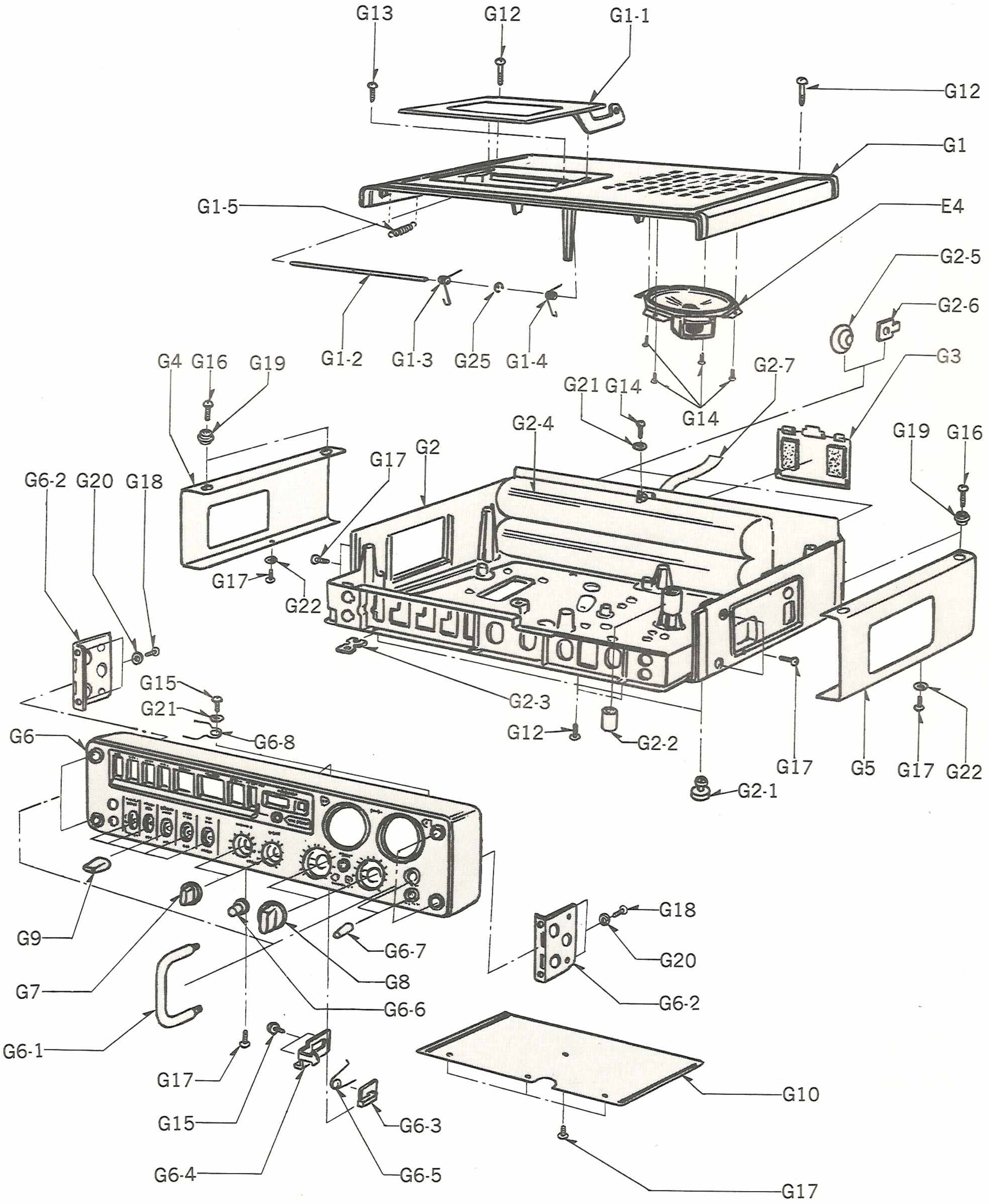
CABINET PARTS


G13
G12
G1-1
G12
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G1-5
E4
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G2-6
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G16
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G1-2
G1-3
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G2-7
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G18
G20
G6-2
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G6-6
G6-1
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G6-3
G6-4
G6-5
G17

REPLACEMENT PARTS LIST

Technics MODEL RS-646DS-D

RS-646DS-D

NOTE:

1. Be sure to make your orders of replacement parts according to this list.
2. "Ⓝ" in "Remarks" column indicates new parts.
3. For parts which are shaded (▨), only parts specified by the manufacturer should be used for replacement in critical circuit.

NOTA:

1. Habrá que asegurarse que los pedidos de piezas de repuesto se hagan según esta lista.
2. "Ⓝ" marcado en la columna "Remarks", quiere decir que las piezas son nuevas.
3. Para las partes de la lista que están sombreadas (▨), deben ser usadas para hacer el reemplazo en los circuitos críticos solamente las partes que están especificadas por el productor.

NOTE:

1. Bien s'assutet de se conformer à la liste suivante pour les commandes de pièces de rechange.
2. "Ⓝ", dans la colonne "Remarks", indique les pièces nouvelles.
3. Concernant les pièces dans les parties hachurées (▨), doivent être remplacées dans les circuits critiques uniquement par des pièces spécifiées par le fabricant.

HIENWEIS:

1. Bestellen Sie Ihre Ersatzteile genau nach dieser Liste.
2. "Ⓝ" in der "Remarks" Spalte bedeutet "neue Teile".
3. Für diejenigen Positionen in der Ersatzteil-Liste, die auf schraffiertem Untergrund (▨) gedruckt sind, dürfen nur vom Hersteller zugelassenene Fabrikate als Ersatzteile in den kritischen Schaltkreisen verwendet werden.

按：

1. 關於代用零件之訂購，務請依照此表而行之爲荷。
2. 「備考」(Remarks)一欄中之"Ⓝ"形符號標記表示該零件爲新出品。
3. 印有灰色(▨)的標號表示，祗有那些由製造公司所指定及證明的零件，才能用來代換。

Ref. No.		Part No.	Part Name & Description	Pcs/Set	Remarks
			MECHANICAL PARTS		
M1		QXZ0047	Cassette Retainer Assembly	1	RS-640US
M1-1		QBS1057	Brake Spring	1	〃
M1-2		QML2934	Erase Safety Lever	1	〃
M2		QBN1306B	Auto-Stop Release Spring	1	〃
M3		QMR1500	Brake	1	〃
M4		XSN26+8	Screw ⊕2.6×8	2	COMMON
M5		XSN2+6	Screw ⊕2×6	4	〃
M6		XWC2B	Lock Washer	5	〃
M7		QXA0600A	Mechanism Angle (R)	1	
M8		QXR0295	Lock Rod Assembly	1	
M9		QDC0088	Tape Counter	1	
M10		QDB0229	Tape Counter Belt-1	1	
M11		QDP1711	Connection Pulley	1	
M12		QBW2016	Poly Washer	2	RS-9900US
M13		XUC25FT	Stop Ring	3	COMMON
M14		QBT1750M	Spring	3	RS-671AUS
M15		QML2898A	Pause Lock Plate	1	RS-600US
M16		QBN1480A	Pause Lock Spring	1	〃
M17		QBK7007	Washer	3	RS-9900US
M18		XUC3FT	Stop Ring	8	COMMON
M19		QMF1927	Switch Mounting Plate	1	
M20		QBK1163	Isoluation Sheet	1	RS-671AUS
M21		XSN2+10	Screw ⊕2×10	2	COMMON
M22		XSN26+6	Screw ⊕2.6×6	10	〃
M23		XWA26B	Spring Washer	10	〃
M24		QHQ1168	Step Screw	4	〃
M25		XSS3+6	Screw ⊕3×6	2	〃
M26		XTN3+8B	Screw ⊕3×8	3	〃
M27		QML2936	Auto-Stop Release Lever	1	RS-640US
M28		QBN1504	Auto-Stop Release Spring	1	〃
M29		QBK7124	Fiber Washer	2	COMMON
M30		QBK7126	〃	1	〃
M31		QXL0998A	Idler Lever Assembly	1	RS-640US

Ref. No.		Part No.	Part Name & Description	Pcs/ Set	Remarks
M32		QWQ1124	Snap Washer	6	COMMON
M33		QBT1814DM	Idler Spring	2	RS-640US
M34		QMR1548	Detecting Rod	1	
M35		QBW2017	Poly Washer	1	COMMON
M36		QML3034	Detecting Lever (B)	1	
M37		QXL1069B	Detecting Lever (A) Assembly	1	
M38		XUC2FT	Stop Ring	4	COMMON
M39		QKJ0055	Cassette Up	1	RS-640US
M40		QXA0484	Cassette Up Holder Assembly	1	〃
M41		QBNM0006	Cassette Up Spring	1	〃
M42		XSS26+6	Screw ⊕2.6×6	2	COMMON
M43		QXD0069	Supply Reel Table Assembly	1	
M44		QBW2013	Poly Washer	3	COMMON
M45		QBC1272	Back Tension Spring	1	RS-640US
M46		QXD0055	Takeup Reel Table Assembly	1	〃
M47		QXL1003	Auto-Stop Lever Assembly	1	〃
M48		QDB0124	Tape Counter Belt-2	1	RS-630US
M49		QXL1036	Pressure Roller Assembly	1	RS-640US
M50		QDG1073	Cam Gear	1	〃
M51		QML2930	Cam Lever	1	〃
M52		QMC0035	Cam Gear Collar	1	〃
M53		QXL0999	Gear Lever Assembly	1	〃
M54		XSN2+8	Screw ⊕2×8	3	
M55		QHQ1230	Head Azimuth Adjustment Screw	1	RS-640US
M56		QBC1103A	Head Spring	1	〃
M57		QBN1484	Pressure Roller Spring	1	〃
M58		QMZ1173	Head Seat	1	〃
M59		QTD1251	Head Wires Clamper	1	〃
M60		QDK1012	Steel Ball	4	〃
M61		QXK1741	Head Base Plate Assembly	1	〃
M62		XSN26+10	Screw ⊕2.6×10	2	COMMON
M63		QBP1673A	Head Base Plate Spring	1	RS-640US
M64		QMK1558	Upper Base Plate	1	〃
M65		QMR1411	Operation Lever (C)	1	〃
M66		QHQ1169	Step Screw	2	〃

Ref. No.		Part No.	Part Name & Description	Pcs/ Set	Remarks
M67		QXR0077A	Operation Lever Assembly	1	RS-640US
M68		QBT1619M	Idler Spring	2	〃
M69		QXB0456	Push Button Assembly	1	
M69-1		QGO1301	Push Button (Eject)	1	
M69-2		QGO1300	Push Button (Record)	1	
M69-3		QGO1299	Push Button (Rewind, Fast Forward, Pause)	3	
M69-4		QGO1298	Push Button (Playback)	1	
M69-5		QGO1297	Push Button (Stop)	1	
M69-6		QGO1302	Push Button (Silent Stop)	1	
M69-7		QBN1512A	Push Button Spring	1	
M70		XUC5FT	Stop Ring	3	COMMON
M71		XSN26+3	Screw ⊕2.6×3	1	〃
M72		QXP0494	Motor Pulley Assembly	1	RS-640US
M72-1		XSN2+3	Screw ⊕2×3	1	COMMON
M73		XSN26+3	Screw ⊕2.6×3	2	〃
M74		QMS1833	Motor Holding Screw	3	〃
M75		QBG1055A	Motor Rubber Cushion	3	RS-640US
M76		QMA1952A	Motor Angle	1	〃
M77		MHI5R2CY	Motor	1	
M78		QML2712	Eject Operation Lever	1	RS-640US
M79		QBT1580M	Eject Operation Lever Spring	2	〃
M80		QXL1068	Record Lever Assembly	1	
M81		QML3035	Record Lever-1	1	
M82		QBN1520	Record Lever Spring	1	
M83		QXL1000	Fast Forward Lever Assembly	1	RS-640US
M84		XUC6FT	Stop Ring	1	COMMON
M85		QXH0247	Flywheel Retainer Assembly	1	
M86		QBT1486DM	Spring	2	RS-640US
M87		QDB0226	Flywheel Belt	1	〃
M88		QXF0130	Flywheel Assembly	1	
M89		QBJ3221	Poly Washer	1	COMMON
M90		XWC26B	Washer	1	〃
M91		QMA2997	Stopper Angle	1	
M92		QBN1493	Lock Spring	1	RS-640US
M93		QML2379B	Lock Plate	1	〃

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
M94	QXR0294A	Pause Rod Assembly	1	
M95	QMR1599	Pause Rod-2	1	
M96	QBT1734M	Spring	1	
M97	QBT1556	〃	1	
M98	QXR0241	Stop Rod	1	
M98-1	QBG1497A	Brake Rubber	1	RS-630US
M100	QXR0202B	Playback Rod Assembly	1	
M101	QBK7130	Fiber Washer	1	COMMON
M102	QMR1502	Fast Forward Rod (A)	1	RS-640US
M103	QMR1503A	Fast Forward Rod (B)	1	〃
M104	QBT1798DMA	Spring	1	Ⓝ
M105	QMR1498	Rewind Rod	1	RS-640US
M106	QMR1546	Record Rod	1	
M107	QXL1002B	Eject Lever Assembly	1	RS-640US
M108	QGG0050	Lever Guide	1	〃
M109	QBT1604M	Eject Lever Spring	1	〃
M110	QXH0227	Push Button Lock Plate Assembly	1	〃
		RESISTORS		
R7, 8	ERD25TJ100	Carbon Resistor 10Ω 1/4W	2	
R11, 12	ERD25TJ104	Noiseless Resistor 100KΩ 1/4W	2	
R13, 14	ERD25TJ104	Carbon Resistor 100KΩ 1/4W	2	
R17, 18	ERD25TJ821	〃 820Ω 1/4W	2	
R19, 20	ERD25TJ123	〃 12KΩ 1/4W	2	
R21, 22	ERD25TJ184	〃 180KΩ 1/4W	2	
R23, 24	ERD25TJ183	〃 18KΩ 1/4W	2	
R29, 30	ERD1ANJ151	Metal-oxide Resistor 150Ω 1W	2	
R37, 38	ERD25TJ394	Carbon Resistor 390KΩ 1/4W	2	
R47, 48	ERD25TJ105	〃 1MΩ 1/4W	2	
R51, 52	ERD25TJ124	〃 120KΩ 1/4W	2	
R53, 54	ERD25TJ222	〃 2.2KΩ 1/4W	2	
R58	ERD25TJ333	〃 33KΩ 1/4W	1	
R59, 60	ERD25TJ823	〃 82KΩ 1/4W	2	
R65, 66	ERD25TJ153	〃 15KΩ 1/4W	2	
R67, 68	ERD25TJ124	〃 120KΩ 1/4W	2	
R73, 74	ERD25TJ102	Carbon Resistor 1KΩ 1/4W	2	
R77, 78	ERD25TJ473	〃 47KΩ 1/4W	2	
R79, 80	ERD25TJ332	〃 3.3KΩ 1/4W	2	
R81, 82	ERD25TJ105	〃 1MΩ 1/4W	2	
R83, 84	ERD25TJ185	〃 1.8MΩ 1/4W	2	
R101, 102	ERD25TJ272	〃 2.7KΩ 1/4W	2	
R103, 104	ERD25TJ102	〃 1KΩ 1/4W	2	
R105, 106	ERD25TJ330	〃 33Ω 1/4W	2	
R107, 108	ERD25TJ470	〃 47Ω 1/4W	2	
R111, 112, 113, 114				
	ERD25TJ274	〃 270KΩ 1/4W	4	
R115, 116	ERD25TJ224	〃 220KΩ 1/4W	2	
R119, 120	ERD25TJ682	〃 6.8KΩ 1/4W	2	
R129, 130	ERD25TJ391	〃 390Ω 1/4W	2	
R131, 132	ERD25TJ100	〃 10Ω 1/4W	2	
R133, 134	ERD25TJ332	〃 3.3KΩ 1/4W	2	
R135, 136	ERD25TJ221	〃 220Ω 1/4W	2	
R141, 142	ERD25TJ471	〃 470Ω 1/4W	2	
R143, 144	ERD25TJ101	〃 100Ω 1/4W	2	
R159	ERD25TJ330	〃 33Ω 1/4W	1	
R160	ERD25TJ682	〃 6.6KΩ 1/4W	1	
R161	ERD25TJ184	〃 180KΩ 1/4W	1	
R162	ERD25TJ104	〃 100KΩ 1/4W	1	
R163	ERD25TJ273	〃 27KΩ 1/4W	1	
R164	ERD25TJ680	〃 68Ω 1/4W	1	
R165	ERD25TJ221	〃 220Ω 1/4W	1	
R166	ERD25TJ101	〃 100Ω 1/4W	1	
R167	ERD25TJ681	〃 680Ω 1/4W	1	
R168	ERD25TJ102	〃 1KΩ 1/4W	1	
R169, 170	ERX1ANJ1R0	Metal-oxide Resistor 1Ω 1W	2	
R171	ERD25TJ6R8	Carbon Resistor 6.8Ω 1/4W	1	
R172	ERD25TJ102	〃 1KΩ 1/4W	1	
R173	ERD25TJ471	〃 470Ω 1/4W	1	
R176	ERD25TJ331	〃 330Ω 1/4W	1	
R177	ERD25TJ103	〃 10KΩ 1/4W	1	

Ref. No.		Part No.	Part Name & Description	Pcs/Set	Remarks
R178		ERD25TJ222	Carbon Resistor 2.2KΩ 1/4W	1	
R179		ERD25TJ182	〃 1.8KΩ 1/4W	1	
R180		ERD25TJ821	〃 820Ω 1/4W	1	
R181, 182		ERD25TJ102	〃 1KΩ 1/4W	2	
R189		ERD25TJ392	〃 3.9KΩ 1/4W	1	
R201		ERD25TJ561	〃 560Ω 1/4W	1	
R202		ERD25TJ680	〃 68Ω 1/4W	1	
R203		ERD25TJ1R5	〃 1.5Ω 1/4W	1	
R204		ERD25TJ122	〃 1.2KΩ 1/4W	1	
R205		ERD25TJ102	〃 1KΩ 1/4W	1	
R301		ERQ12HJ180	Fuse Resistor 18Ω 1/2W	1	
R302		ERD25TJ102	Carbon Resistor 1KΩ 1/4W	1	
R303		ERQ12HJ5R6	Fuse Resistor 5.6Ω 1/2W	1	
R304		ERD25TJ102	Carbon Resistor 1KΩ 1/4W	1	
R305		ERD25TJ223	〃 22KΩ 1/4W	1	
R306		ERG1ANJ102	Metal-oxide Resistor 1KΩ 1W	1	
R307		ERX1ANJ1R5	〃 1.5Ω 1W	1	
R308		ERD25TJ101	Carbon Resistor 100Ω 1/4W	1	
			VARIABLE RESISTORS		
VR1, 2		EVLS3AA00B24	Semi-fixed Variable Resistor 20KΩ(B)	2	RS-640US
VR3, 4		EVLS3AA00B54	〃 50KΩ(B)	2	〃
VR5, 6		EVLS3AA00B13	〃 1KΩ(B)	2	RS-600US
VR7, 8		EVLS3AA00B54	〃 50KΩ(B)	2	RS-640US
VR9, 10, 11		EVLS3AA00B53	〃 5KΩ(B)	3	RS-630US
VR12		EVLS3AA00B54	〃 50KΩ(B)	1	RS-640US
VR601, 602		EVH3SA085A24	Variable Resistor 20KΩ(A)	2	
VR603		EVH3SA085D14	〃 10KΩ(D)	1	
VR604		EVH5VC085A14	〃 10KΩ(A)	1	
			CAPACITORS		
C1, 2		ECCD1H271K	Ceramic Capacitor 270pF	2	
C3, 4		ECKD1H681KB	〃 680pF	2	
C5, 6		ECCD1H271K	〃 270pF	2	
C7, 8		ECKD1H102MD	〃 1000pF	2	
C9, 10		ECEA50M4R7	Electrolytic Capacitor 4.7μF	2	
C11, 12		ECEA16V1000	〃 1000μF	2	
C13, 14		ECKD1H152MD	Ceramic Capacitor 1500μF	2	
C15, 16		ECEA16V10	Electrolytic Capacitor 10μF	2	
C17, 18		ECEA16V47	〃 47μF	2	
C21, 22		ECEA50M4R7	〃 4.7μF	2	
C23, 24		ECKD1H681KB	Ceramic Capacitor 680pF	2	
C25, 26		ECQM05123KZ	Mylar Capacitor 0.012μF	2	
C27, 28		ECKD1H391KB	Ceramic Capacitor 390pF	2	
C29, 30		ECQM05123KZ	Mylar Capacitor 0.012μF	2	
C31, 32, 33, 34		ECEA16V10	Electrolytic Capacitor 10μF	4	
C35, 36, 37, 38		ECEA50V1	〃 1μF	4	
C39, 40		ECEA16V33	〃 33μF	2	
C41, 42		ECEA50V4R7	〃 4.7μF	2	
C43, 44		ECEA16V10	〃 10μF	2	
C45, 46		ECEA50M4R7	〃 4.7μF	2	
C47, 48		ECQM05562KZ	Mylar Capacitor 0.0056μF	2	
C49, 50		ECQM05472KZ	〃 0.0047μF	2	
C51, 52		ECQM05273KZ	〃 0.027μF	2	
C53, 54		ECEA16V10	Electrolytic Capacitor 10μF	2	
C55, 56		ECEA50MR1	〃 0.1μF	2	
C57, 58		ECEA30V4R7	〃 4.7μF	2	
C59, 60		ECEA50ZR1	〃 0.1μF	2	
C61, 62		ECEA16V10	〃 10μF	2	
C63, 64		ECEA50ZR33	〃 0.33μF	2	
C65, 66		ECEA50ZR1	〃 0.1μF	2	
C67, 68		ECEA16V10	〃 10μF	2	
C69, 70, 71, 72		ECEA50ZR1	〃 0.1μF	4	
C73, 74		ECEA50V1	〃 1μF	2	
C75		ECSZ16EF3R3	Tantalum Capacitor 3.3μF	1	
C76		ECEA50V3R3	Electrolytic Capacitor 3.3μF	1	
C77, 78		ECEA16V10	〃 10μF	2	
C79, 80		ECQM05563MZ	Mylar Capacitor 0.056μF	2	
C81, 82		ECQM05563KZ	〃 0.056μF	2	
C83, 84		ECQM05122KZ	〃 0.0012μF	2	

Ref. No.		Part No.	Part Name & Description	Pcs/Set	Remarks
C85, 86		ECQS1122KZ	Styrol Capacitor 1200pF	2	
C87, 88		ECEA50V1	Electrolytic Capacitor 1μF	2	
C89, 90		ECEA16V47	〃 47μF	2	
C91, 92		ECEA50V3R3	〃 3.3μF	2	
C93		ECEA16V33	〃 33μF	2	
C94, 95		ECQM05104MZ	Mylar Capacitor 0.1μF	2	
C96, 97		ECEA50V1	Electrolytic Capacitor 1μF	2	
C98		ECEA50V3R3	〃 3.3μF	1	
C99		ECKD1H681KB	Ceramic Capacitor 680pF	1	
C100		ECEA16V100	Electrolytic Capacitor 100μF	1	
C101		ECEA50V1	〃 1μF	1	
C102		ECEA16V470	〃 470μF	1	
C103		ECEA50V1	〃 1μF	1	
C104		ECKD1H102MD	Ceramic Capacitor 1000pF	1	
C105, 106		ECKD1H471KB	〃 470pF	2	
C107, 108		ECCD1H220KC	〃 22pF	2	
C109, 110		ECCD1H121K	〃 120pF	2	
C111, 112, 113, 114					
		ECKD1H102MD	〃 1000pF	4	
C201		ECEA50V1	Electrolytic Capacitor 1μF	1	
C202		ECQM05104MZ	Mylar Capacitor 0.1μF	1	
C203		ECQF6222KZH	Styrol Capacitor 0.0022μF	1	
C204, 205		ECCD1H101K	Ceramic Capacitor 100pF	2	
C206		ECQM05104MZ	Mylar Capacitor 0.1μF	1	
C301		ECEA16V470	Electrolytic Capacitor 470μF	1	
C302		ECEA25V1000	〃 1000μF	1	
C303		ECEA16V470	〃 470μF	1	
C305, 306		ECEA16V2200	〃 2200μF	2	
			TRANSISTORS		
Tr1, 2, 3, 4		2SC828	Transistor	4	
Tr5, 6		2SC1684	〃	2	
Tr7, 8, 9, 10, 11, 12					
		2SC828	〃	6	
Tr13, 14		2SK30AD	FET	2	

Ref. No.		Part No.	Part Name & Description	Pcs/Set	Remarks
Tr15, 16		2SC828	Transistor	2	
Tr17, 18		2SA564	〃	2	
Tr19, 20, 21, 22, 23, 24, 25, 26					
		2SC828	〃	8	
Tr27		2SA564	〃	1	
Tr28, 29, 30, 31		2SC828	〃	4	
Tr32		2SC1847(R)	〃	1	
Tr33		2SA886(R)	〃	1	
Tr34, 35		2SA564	〃	2	
Tr36		2SC828	〃	1	
Tr201		2SC1383(S)	〃	1	
Tr202		2SB324	〃	1	
Tr301		2SC1568	〃	1	
			INTEGRATED CIRCUITS		
IC1, 2		QVITA7122AP	Integrated Circuit	2	
			DIODES		
D1, 2, 3, 4		OA90MLF	Diode	4	RQ-544AS
D5, 6, 7, 8		MV121LF	〃	4	RS-462S
D9, 10		OA91LF	〃	2	RS-640US
D11, 12		MA150LF	〃	2	RS-9900US
D13, 14		OA90MLF	〃	2	RQ-544AS
D15		MA1062LF	〃	1	
D16		OA90MLF	〃	1	RQ-544AS
D17		MA150LF	〃	1	RS-9900US
D18		MA1051LF	〃	1	
D201		MA150LF	〃	1	RS-9900US
D202		MA1075LF	〃	1	
D301		SM102LF	〃	1	
D302, 303		10DC1	〃	2	
D304		SM102LF	〃	1	
D305		MA1150LF	〃	1	
D306		TLR103	LED	1	
D307		SM102LF	Diode	1	

Ref. No.		Part No.	Part Name & Description	Pcs/ Set	Remarks
			TRANSFORMERS		
T1, 2		QLT2D10A	Headphone Transformer	2	
T3		QLBT0111	Oscillator Transformer	1	
T4		QLPD26ELX	Power Transformer	1	
			COILS		
L1, 2		QLM9Z002W	Low Pass Filter	2	
L3, 4		QLQX2421Y	Coil	2	
L5, 6		QLH2008	Choke Coil	2	
L302		QLQX2421Y	Coil	1	
			SWITCHES		
S1		QSS7203	Slide Switch (Record/Playback Selector)	1	RQ-548S
S2		QST4305T	Lever Switch (LINE/MIC Selector)	1	
S3		QST4210T	Lever Switch (Equalizer Selector)	1	
S4, 5		QST2215T	Lever Switch (Limiter, Dolby Selector)	2	
S6		QSW2202	Push Switch (Battery Check)	1	
S7		QST2215T	Lever Switch (Bias Selector)	1	
S8		QSW2202	Push Switch (Meter Light)	1	
S9		QSB0169M1	Leaf Switch (Motor ON/OFF)	1	RS-640US
S10		QSM0037	Micro Switch (Motor ON/OFF)	1	RS-276US
S11		Refer to E37	AC/DC Selector Switch	1	RQ-548S
S12		Refer to VR603	Speaker ON/OFF Switch	1	
S13		QSB0169M1	Leaf Switch	1	RS-640US
S14		QSS2209T	Muting Switch	1	〃
S15		RSR2A01ZAH	2 Voltages Selector Switch	1	Ⓝ
			JACKS		
J1, 2, 3, 4		Refer to E8	LINE IN/LINE OUT/DIN Jacks (Interlocked with Jack Board)	1	
J5		QJA0252H	Headphone Jacks	1	
J6, 7		QJA0248	Microphone Jacks	2	RS-671AUS
			PILOT LAMPS		
PL1, 2		XAMQ23P200N	Pilot Lamp	2	

Ref. No.		Part No.	Part Name & Description	Pcs/ Set	Remarks
			ELECTRICAL PARTS		
E1		WY436AD	Record/Playback Head	1	
E2		QWY2118	Erase Head	1	RS-640US
E3		QSL4006RNM	Level Meter (Battery Indicator)	1	
E4		QSL4007RNM	〃	1	
E5		EAS10P101S	Speaker	1	
E6		QMK1610	Front Chassis	1	
E7		QMA2969	Jack Board Angle	1	
E8		QEJ5004S	Jack Board Assembly	1	
E9		QMA2973	Jack Angle	1	
E10		QTW1142	Isolation Sheet for Mic Jack	1	
E11		QTS1390	Mic Jack Shield Plate	1	
E12		QNQ1051	Mic Jack Nut	2	RS-630TUS
E13		QBH2015	Shelter for Lever Switch	1	
E14		QMA2972	LED Angle	1	
E15		QBG1562	Rubber Bushing	1	
E16		QNQ1004	VR Nut	4	COMMON
E17		QWQ2002	Spring Washer	4	〃
E18		QXH0246	VR Shaft Holding Bass Assembly	1	
E19		QDG1099	VR Gear (B)	1	
E20		QDG1100	VR Gear (C)	1	
E21		QDG1098	VR Gear (A)	1	
E22		QBC8006A	Pressure Spring for Gear	2	
E23		QMS2420A	Shaft	1	
E24		QDG1101	VR Gear (D)	1	
E25		XUC3FT	Stop Ring	3	COMMON
E26		QBW2019	Poly Washer	1	〃
E27		QBK7005	Fiber Washer	1	RS-9900US
E28		QBW2018	Poly Washer	1	COMMON
E29		QBK7017	Fiber Washer	1	RS-466S
E30		QMA2971	Meter Holding Plate	1	
E31		QBG1395	Meter Lamp Cover	2	RS-640US
E32		QBJ3122	Washer for Headphone Jack	1	
E33		QBJ3149	〃	1	

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
E34	QNQ1033	Headphone Jack Nut	1	RQ-309AVS
E35	QMA2970	Headphone Jack Angle	1	
E36	QMA2968	Power Transformer Angle	1	
E37	QJS0329	AC/DC-IN Socket	1	Ⓝ
E38	QTW1135	AC/DC-IN Cover	1	Ⓝ
E39	QTD1179	Wire Clamper	1	
E40	QMA3168	Fuse Angle	1	
E41	QTF1020	Fuse Holder	1	RS-630US
E43	QJT1040	1 Pin Connector	31	
E44	QJS0776	2 Pin Connector Socket	3	RQ-548S
E45	QJS0777	3 Pin Connector Socket	2	〃
E46	QJS0784JN	3 Pin Housing	2	RS-462S
E47	QJS0790J	6 Pin Sonnector Socket	1	
E48	QJP1908JO	3 Pin Connector Plug	2	RS-462S
E49	QJP1902JO	6 Pin Connector Plug	1	RS-600US
E50	QJT1041	Flat Pin for Connector	13	RQ-542S
E51	QJT1042	Contact	6	RS-640US
E52	QBP1753	Earth Flat Spring	1	
E53	QTD1001	Earth Lug	1	RS-671AUS
E54	XSN3+8S	Screw ⊕3×8	5	COMMON
E55	XTN3+10B	Screw ⊕3×10	7	〃
E56	XSB3+6BVS	Screw ⊕3×6	1	〃
E57	XWG3	Washer	5	〃
E58	XBAQ080030	Mini Fuse (800mAT)	2	Ⓝ
E59	RUV426ZA	2 Voltages Selector Switch Cover	1	
E60	QMF1934	2 Voltages Selector Switch Holding Plate	1	
E61	QMA3245	Holding Angle	1	
		CABINET PARTS		
G1	QYP0649	Top Panel Assembly	1	
G1-1	QYF0270	Cassette Door Assembly	1	
G1-2	QMNM0002	Cassette Door Shaft	1	RS-640US
G1-3	QBNM0009	Cassette Door Spring (L)	1	〃
G1-4	QBNM0008	Cassette Door Spring (R)	1	〃
G1-5	QBT1489M	Cassette Door Spring	1	〃

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
G2	QYM0434	Main Body Case Assembly	1	
G2-1	QBG1447	Rubber Foot	2	RS-640US
G2-2	QMF1692	Front Holding Plate	3	
G2-3	QYD1020A	Battery Case Assembly	1	
G2-4	QBN8009	Battery Terminal (−) Side	2	
G2-5	QJB0042	Battery Terminal (+) Side	2	RS-462S
G3	QYF0274	Battery Cover Assembly	1	
G4	QGK2664	Side (L) Ornament Cover	1	
G5	QGK2665	Side (R) Ornament Cover	1	
G6	QYP0678	Front Panel Assembly	1	
G6-1	QKH1132	Handle	2	
G6-2	QMA2974	Reinforcing Angle	2	
G6-3	QGO1237A	Tape Counter Button	1	
G6-4	QMA2716	Tape Counter Button Angle	1	
G6-5	QBN1482A	Tape Counter Button Spring	1	
G6-6	QGO1309	Lock Button	1	
G6-7	QGO1296	Push Button	2	
G6-8	QBN8006	Push Button Spring	1	
G7	QYT0419	VR Knob (B) Assembly	2	
G8	QYT0418	VR Knob (A) Assembly	2	
G9	QGT1336	Lever Switch Knob	5	
G10	QGC1068	Bottom Cover	1	
G12	XTN35+50B	Screw ⊕3.5×50	3	COMMON
G13	XSN26+8BN	Screw ⊕2.6×8	2	〃
G14	XTN3+8B	Screw ⊕3×8	5	〃
G15	XTN26+6B	Screw ⊕2.6×6	3	〃
G16	XSN3+6BNS	Screw ⊕3×6	4	〃
G17	XSB3+6BVS	Screw ⊕3×6	13	〃
G18	XSN4+16S	Screw ⊕4×16	4	〃
G19	QGK2666	Washer	4	〃
G20	XWG4	Flat Washer	4	〃
G21	XWG3	〃	1	〃
G22	XWE3FZ	Washer	6	〃
G23	XNG4ES	Nut	4	
G24	XWA4B	Washer	4	

Ref. No.		Part No.	Part Name & Description	Pcs/ Set	Remarks
G25		XUC3FT	Stop Ring	1	
			ACCESSORIES		
A1		RP050A	DIN Cord	1	
A2		QYH0074	Shoulder Belt	1	
A3		QFC1104	AC Cord	1	
A4		QFT6TCJNTBFZ	Demo Tape	1	
A5		QQT2140	Instruction Book	1	
			PACKINGS		
P1		QPN3572	Inside Carton	1	
P2		QPA0321	Inner Cushion (R)	1	
P3		QPA0262	Inner Cushion (L)	1	
P4		XZB40X50XA08	Poly Bag	1	
P5		QPS0246	Spacer (B)	1	
P6		QPA0284	Spacer (C)	1	

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